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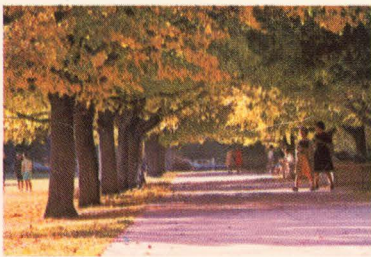
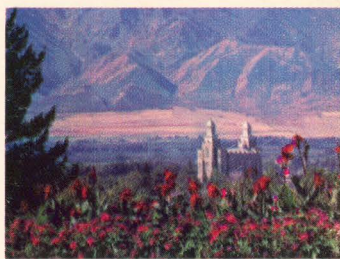
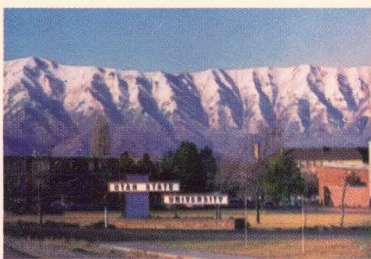
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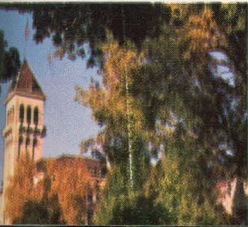
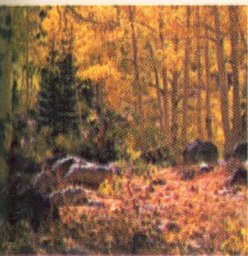
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UTAH STATE UNIVERSITY BULLETIN

1968-69 GRADUATE CATALOG - LOGAN, UTAH



UTAH STATE UNIVERSITY

LOGAN, UTAH
1968-1969
GRADUATE CATALOG

ELDON J. GARDNER, Dean, School of Graduate Studies
Graduate Office, Main 132

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University Departments of Instruction

Department	Catalog Page	Department Head	Office Location
Accounting	59	Norman S. Cannon	Main 131
Aerospace Studies		Roland H. Taylor	MS 107
Agricultural Economics	45	N. Keith Roberts	Ag Science 230
Agricultural Education	47	Von H. Jarrett	Ag Science 110
Agricultural and Irrigation Engineering	117	A. Alvin Bishop	Engineering C-5
Animal Science	48	James A. Bennett	Animal Ind. 307
Applied Statistics and Computer Science	181	Rex L. Hurst	Main 2
Art	148	Harrison T. Groutage	Main 308
Audiology—Speech Pathology	153	Jay R. Jensen	Mech. Arts 202
Bacteriology, Public Health	185	Rex S. Spendlove	Plant Ind. 309
Botany	187	Orson S. Cannon	Plant Ind. 204
Business Administration	61	Howard M. Carlisle (acting)	Main 131
Business Education and Office Administration	67	Theodore W. Ivarie	Main 347
Chemistry	190	Melvin C. Cannon	Widtsoe 112
Civil Engineering	120	Elliot Rich	Engineering L-4
Clothing and Textiles	139	Anne Kernalleguen	Family Life 308
Dairy Science	50	George E. Stoddard	Animal Science
Economics	70	Reed R. Durtschi	Main 328
Educational Administration	86	Homer M. Johnson	Education 206
Electrical Engineering	127	Larry S. Cole	Engineering L-4
Elementary Education	90	Malcom Allred	Education 205
English and Journalism	157	T. Y. Booth	Library 416
Family and Child Development	141	Don C. Carter	Family Life 211
Food and Nutrition	143	Ethelwyn B. Wilcox	Family Life 111
Forest Science	172	Ross S. Whaley	For.-Zoo. 155
Geology	192	Clyde T. Hardy	Main 258
Health, Physical Education and Recreation	92	H. B. Hunsaker	Gym 304
History	74	George Ellsworth	Main 247
Homemaking Education	145	Virginia H. Harder	Family Life 318
Household Economics and Management	146	Edith Nyman	Family Life 314
Industrial and Technical Education	131	Neill Slack (acting)	Mech. Arts 102
Instructional Media and Library Science	95	Lester C. Essig	Library 222
Landscape Architecture and Environmental Planning	162	Burton Taylor	Main 1
Languages		Austin E. Fife	Main 212
Manufacturing Engineering	134	Carl D. Spear	Tech. Services
Mathematics	194	Neville C. Hunsaker	Engineering C-5
Mechanical and Aerospace Engineering	136	Reynold K. Watkins	Engineering L-4
Military Science		Owen W. Owens	MS 102
Music	164	Max F. Dalby	Fine Arts 107
Physics	196	W. Farrell Edwards	Engineering L-4
Plant Science	51	Frank B. Salisbury	Ag Science 322
Political Science	78	M. Judd Harmon	Main 248
Psychology	99	Heber C. Sharp (acting)	Education 300
Range Science	175	L. A. Stoddard	For.-Zoo. 161
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Special Education	107	Kaye D. Owens (acting)	Education 413
Speech	167	Rex E. Robinson	Main 33
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Veterinary Science	58	Merthyr L. Miner	Vet. Science 144
Wildlife Resources	177	William F. Sigler	For.-Zoo. 163
Zoology	198	Datus M. Hammond	For.-Zoo. 117

Graduate Council

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.....	College of Business and Social Sciences, 1971
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.....	College of Education, 1968
BRUCE O. WATKINS, PhD, University of Minnesota	
.....	College of Engineering, 1968
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.....	College of Natural Resources, 1969
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.....	College of Humanities and Arts, 1970
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	College of Science, 1970
MILTON C. ABRAMS, PhD, University of Utah
	Librarian, ex-officio

¹Date indicates expiration of current appointment to Graduate Council.

Graduate Faculty

A plan for the designation of a Graduate Faculty has been proposed by the Graduate Council and approved by the Council for Academic Affairs, Faculty Senate, and the Board of Trustees.

According to this plan, the Graduate Faculty will consist of two classes of membership: full and associate. Those who qualify for full membership will include individuals who possess an earned doctorate degree, and who have demonstrated scholarship through research, publication, or exposition of creative effort. The requirement of the earned doctorate may be waived in the instance of individuals who have demonstrated exceptional creative ability. A full member will be qualified to serve as a major professor or thesis director on a terminal de-

gree committee. The associate membership will be conferred to those who have not earned the terminal degree and who have demonstrated scholarship through publication or exposition of creative effort. The associate member will be qualified to serve as a major professor or thesis director on intermediate level graduate degrees.

Faculty members listed in this 1968-69 graduate catalog are tentatively considered charter members of the Utah State University Graduate Faculty, either as associate or full members. The class of membership will be considered on an individual basis, and future graduate catalogs are expected to list full and associate members of the Graduate Faculty.

Guide to Campus Map

1. Old Main, G-11
2. Family Life Home, I-10
3. Amphitheater, H-13
4. Mechanic Arts, H-13
5. Technical Services, G-14
6. Psychology Laboratory, G-14
7. Education, G-13
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10. Plant Industry, E-12
11. Animal Industry, F-11
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15. Smart Gymnasium, G-9
16. Heating Plant, G-8
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21. Sorority Houses, F-7
22. Fraternity, Sorority Houses, F-6
23. Catholic Newman Center, F-6
24. New Fieldhouse Site, E-7
25. Physical Education, E-9
26. Nelson Fieldhouse, F-8
27. Student Union, F-9
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31. Forestry and Zoology, E-10
32. Rural Arts, D-12
33. Photography, E-12
34. Agricultural Science, E-12
35. Greenhouses, E-12
36. Business, E-13
37. Lund Hall, Girls' Dorm, E-14
38. Moen Hall, Girls' Dorm, E-14
39. Greaves Hall, Girls' Dorm, D-14
40. Reeder Hall, Girls' Dorm, D-14
41. Merrill Hall, Girls' Dorm, D-14
42. Engineering, D-13
43. Automotive, Aeronautics, D-12
44. USDA Research Lab, D-12
45. Apiculture Research Lab, D-12
46. Food Science and Tech., D-12
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48. Plant Operations Shop, D-10
49. Plant Operations Center, D-10
50. Plant Operations Shops, D-11
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52. Baseball Diamond, D-9
53. Tennis Courts, D-9
54. Edith Bowen Elementary Lab School, D-10
55. New High Rise Dorms, C-9
56. New High Rise Service Center, C-10
57. High Rise Dorms, C-10
58. Dormitory Cafeteria, C-10
59. Richards Hall, Men's Dorm, C-11
60. Bullen Hall, Men's Dorm, C-11
61. Radio-TV Center, B-11
62. Crops Research Center, C-12
63. Fine Arts Center, C-13
64. LDS University Stake Center, B-13
65. Water Research Lab., A-15
by River on Canyon Road
66. Storage-Receiving, B-13
67. University Temporary Apts., B-11
68. Forestry Research Lab., B-10
69. LDS University Stake Center, A-9
70. David O. McKay Housing Center, A-8
71. University Trailer Court, A-7
72. University Apartments, B-6
73. New Assembly Center, C-16
74. Fraternity House, D-5
75. New Football Stadium, C-4
76. Car Pool, Garage, C-2
77. Veterinary Science Buildings, A-5
78. Metabolism Building, C-5
79. VanNoy Apartments, D-2

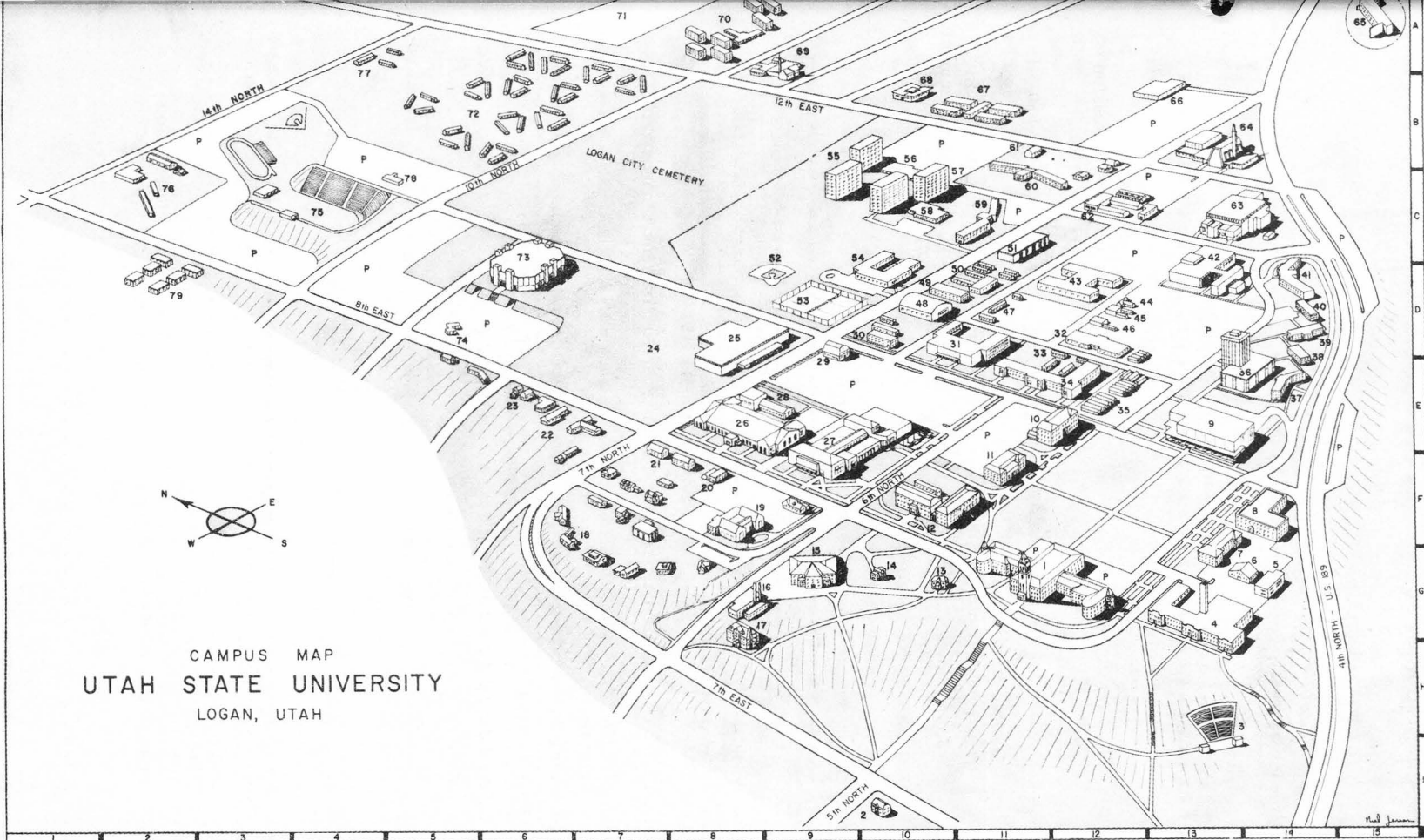
Alphabetical Listing of Key Offices and Buildings

Admissions and Records, G-11 (1)
 Agricultural Science, E-12 (34)
 Animal Industry, F-11 (11)
 Art Barn, E-9 (29)
 Automotive, Aeronautics, D-12 (43)
 Chemistry, (Widtsøe Hall), F-10 (12)
 College of
 Agriculture, E-12 (34)
 Business and Social Sciences, G-11 (1)
 Business (New), E-13 (36)
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 Military Science, E-9 (28)
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 Veterinary Science, E-10 (30)
 Union Building, F-9 (27)

CAMPUS MAP
UTAH STATE UNIVERSITY
LOGAN, UTAH



Calendar, 1968-69

Summer Quarter 1968

June 17, Monday	Registration
June 18, Tuesday	Classwork begins
July 19, Friday	End of first session
July 21, Monday	Registration for second session
August 23, Friday	End of Summer Quarter

Fall Quarter 1968

Early in September	Faculty Meeting
September 25, Wednesday	Testing for entering freshmen
	Orientation and English placement for all entering foreign students
September 26, Thursday	Orientation
September 27, Friday	New student registration
September 28, Saturday	Former student registration
September 30, Monday	Classwork begins
November 3-17 (tentative)	Winter Quarter Pre-Registration
November 28, 29, Thurs., Fri.	Thanksgiving recess
December 13, Friday	Classwork ends
December 16-19, Mon.-Thurs.	Final examinations

Winter Quarter 1969

January 3, Friday	Registration
January 4, Saturday	Registration
January 6, Monday	Classwork begins
March 14, Friday	Classwork ends
March 17-20, Mon.-Thurs.	Final examinations

Spring Quarter 1969

March 24, Monday	Registration
March 25, Tuesday	Registration
March 26, Wednesday	Classwork begins
May 29, Thursday	Classwork ends
May 30, Friday	Memorial Day Holiday
June 2-5, Mon.-Thurs.	Final examinations
June 6, Friday	Baccalaureate
June 7, Saturday	Commencement

Summer Quarter 1969

June 16, Monday	Registration
June 17, Tuesday	Classwork begins
July 18, Friday	End of first session
July 21, Monday	Registration, second session
August 22, Friday	End of Summer Quarter

Utah State University

Utah State University was founded in 1888 as a part of the public educational system of Utah. It operates under the constitution and laws of the state.

USU belongs to a great family of institutions known as land-grant universities, which had their origin in 1862. As a land-grant school, it is a university in the fullest and best sense of that phrase.

USU includes eight resident colleges with fifty-four departments, a School of Graduate Studies, extension services, research programs, and one branch college: Snow College at Ephraim. It participates in educational aid to several foreign countries.

The University is accredited by the Northwest Association of Secondary and Higher Schools. It is on the accepted list of the Association of American Universities and of the American Association of University Women. It is a member of the American Council on Education and is listed by other accrediting agencies.

A fourteen-member Board of Trustees is the governing body of the University. Twelve are appointed by the Governor and ratified by the State Senate. Two others serve ex-officio: the Secretary of State and the President of the University Alumni Association. The Board elects its chairman and vice-chair-

man. All members serve without monetary pay.

Dr. Glen L. Taggart is the eleventh president of USU. He takes office July 1, 1968. Previous presidents, and the year of their appointment, have been as follows: J. W. Sanborn, 1890; J. H. Paul, 1894; J. M. Tanner, 1896; W. J. Kerr, 1900; John A. Widtsoe, 1907; E. G. Peterson, 1916; Franklin S. Harris, 1945; Louis L. Madsen, 1950; Henry Aldous Dixon, 1953; Daryl Chase, 1954, president emeritus, effective July 1, 1968.

Graduate Council

Graduate study is supervised by the dean of the School of Graduate Studies, assisted by the Graduate Council. This council consists of one representative from each of the eight resident colleges of the University and one from the Library.

Regulations and standards for graduate work are established by the Graduate Council with the approval of the Faculty Senate. Students and staff members should consult with the council representatives of their college on questionable interpretations or exceptions to the rules. The dean of the School of Graduate Studies will rule, for and with the advice of the Graduate Council, on all exceptions or adjustments.

Degrees Offered

Graduate degrees can be obtained through the following departments and interdepartmental curriculums:

DOCTOR OF PHILOSOPHY (PhD)

Agricultural and Irrigation
Engineering
Animal Science
Bacteriology and Public Health
Botany
Chemistry
Civil Engineering
Clothing and Textiles
Electrical Engineering
Ecology
Economics
Food Science and Technology
Forest Science
Nutrition and Biochemistry
Mechanical Engineering
Physics
Plant Nutrition and Biochemistry
Plant Science
Psychology
Range Science
Sociology, Social Work and
Anthropology
Soils and Meteorology
Toxicology
Water Quality
Wildlife Resources
Zoology

DOCTOR OF EDUCATION (EdD)

Educational Administration
Industrial Education
Psychology
Supervision and Curriculum
Development

MASTER OF SCIENCE (MS)

Accounting
Agricultural Economics
Agricultural Education
Agricultural and Irrigation
Engineering

Animal Science
American Studies
Applied Statistics and Computer
Science
Audiology-Speech Pathology
Bacteriology and Public Health
Botany
Business Education
Chemistry
Civil Engineering
Clothing and Textiles
Dairy Science
Economics
Educational Administration
Electrical Engineering
Elementary Education
Family and Child Development
Food and Nutrition
Food Science and Technology
Forest Science
Geology
Health, Physical Education and
Recreation
History
Home Economics Education
Household Economics and Manage-
ment
Industrial and Technical Education
Industrial Media and Library
Science
Landscape Architecture and
Environmental Planning
Manufacturing Engineering
Mathematics
Mechanical Engineering
Nutrition and Biochemistry
Physics
Plant Nutrition and Biochemistry
Plant Science
Political Science
Psychology
Range Science
Secondary Education
Sociology, Social Work and
Anthropology
Soils and Meteorology
Special Education

Speech
Toxicology
Veterinary Science
Water Quality
Wildlife Resources
Zoology

MASTER OF ARTS (MA)

American Studies
Art
Economics
Elementary Education
English
History
Music
Political Science
Secondary Education
Speech
Sociology, Social Work and
Anthropology
Theater Arts

MASTER OF EDUCATION (MEd)

Educational Administration
Elementary Education
Health, Physical Education and
Recreation
Instructional Media and Library
Science

Psychology
Secondary Education
Special Education

MASTER OF FINE ARTS (MFA)

Art
Theatre Arts

Additional professional degrees
offered include:

MASTER OF BUSINESS
ADMINISTRATION (MBA)
MASTER OF FORESTRY (MF)
MASTER OF INDUSTRIAL
EDUCATION (MIE)
MASTER OF LANDSCAPE
ARCHITECTURE (MLA)
MASTER OF MUSIC (MM)
CIVIL ENGINEER (CE)
IRRIGATION ENGINEER (IE)
MASTER OF ENGINEERING
SCIENCE (MES)¹

¹Utah State University, University of Utah
and Brigham Young University have each
initiated an identical program leading to the
MES degree. Credits are transferable.

Tuition and Other Fees

The University reserves the right to alter any of these charges without notice.

Fees Per Quarter

***Summer, Fall, Winter, and Spring Quarters**

	Resident Students	Non-Resident Students
--	-------------------	-----------------------

Tuition and		
Registration	\$ 90	\$256
Other Fees	\$ 25	\$ 25
Total Fees	\$115	\$281

*Non-Resident (Non-Utah) students pay the Resident Schedule Summer Quarter.

Other Fees, Costs

Health and Accident Insurance: Students will be required to participate each quarter in a health and accident insurance program unless a written request for exemption is submitted to the University prior to registration. Approximate cost of the insurance will be \$6 per student per quarter.

Excess Registration Fee: For each excess hour (except two hours of Military Science, Aerospace Studies, or one hour of Physical Education)\$10.00
Students may register for 19 hours per quarter without paying excess registration fees.

Automobile Parking Permit: \$7.50 per year.

Out-of-State Student Auto Permit: 50c

LATE REGISTRATION FEE: \$5 beginning second day after specified Registration Days; additional \$1 for each additional day up to a maximum of \$10.

A student whose check is dishonored by his bank will be charged the late fee in effect when the check is redeemed.

Change in Course of Study List: No charge for the first week of the Quarter; \$3 for each change made thereafter.

Final Deadline for Course Changes: Course changes, adds or drops, may be made through the third week of the Quarter.

Special Students—Registration fee\$10.00

Plus \$6 per credit hour (maximum 6 credits)

Visitor Fee—Registration as listener or visitor in lecture course only in which no credit is desired, per quarter, per subject\$10.00

Special Examination Fee—Per Credit

Hour\$ 4.00

Qualifying Examination—Graduate Record Examination

1 Part 3.50

2 Parts 5.50

If a student fails to take the Graduate Qualifying Examination after registering for it, without being officially excused, he will be charged a \$5.00 fee for re-registration.

Graduation Fee 10.00

Student Teaching Fee 36.00

Teacher Placement Re-registration 5.00

Locker Rental—Fall, Winter and Spring 1.50

Fifty Cents of this fee is refunded to students upon returning the key accompanied by receipt prior to the first Friday following Commencement exercises.

Transcript of Credits. Each student is entitled to one transcript free

Additional transcript (Extra copies 25c) 1.00

Transcripts will not be issued unless the money accompanies the order.

Progress Report. Adviser furnished one copy free. Additional copies25c to 50c

Note fee, on individual loans 2.00

Cap and Gown Rental—

Master's 6.50

Doctor's 7.50

College of Humanities and Arts—Students using the language laboratory equipment are required to pay a fee of \$2 per course per quarter except Summer Quarter, which is \$6.

College of Business and Social Sciences—

Students using business machines will be required to pay a fee of \$2 per quarter.

College of Natural Resources—

Senior Field problems:

Forestry 146 35.00

Range Management 196 30.00

Wildlife Management 171 35.00

A maximum fee of \$5 per quarter may be charged in any course requiring use of the computer.

Tuition and Other Fees 15

A minimum excess breakage fee of \$5 may be required for Laboratory classes.

Music—Individual Instruction with members of the University Staff:
Nine lessons per Quarter (1 credit) 30.00
Music 1 Laboratory Fee 1.00
Fees must be paid at beginning of quarter before instruction begins.

Individual instruction with additional authorized teachers is registered for at the University and given like credit, but paid for by private arrangement with the teacher concerned.

Practice Fees:

Practice Room with Piano, 1 hour per day per Quarter	2.50
Practice Room without Piano, 1 hour per day per Quarter	1.75
Organ, 1 hour per day per quarter	5.00

Speech—The fee for Speech 112 is \$20 per credit hour per quarter, consisting of 10 private lessons. Authorized instructors are: Burrell F. Hansen, Floyd T. Morgan.

Registration is not complete until students have presented the fee card at the Cashier's Window, office of the Controller, and have paid fees, and filed the registration cards with the Registrar's Office.

Refunds. All fees paid, with the exception of the \$10 registration fee may be refunded to any student in residence who withdraws from school before the end of the seventh week, in proportion that the number of instructional weeks subsequent to withdrawal bears to the number of instructional weeks in the period covered by the fees paid.

Alumni Fees. After a student has paid a total of \$30 in Alumni Fees, he becomes a Life Member of the USU Alumni Association. Graduate students or students attending more than 12 quarters, and who have been assessed more than the \$30 in Alumni fees, may receive a refund of the excess amount upon sending a written request to the USU Alumni Association within 30 days from the registration day of the quarter in which the additional money was paid

According to the constitution of the Associated Students, a regularly enrolled student must obtain, at time of registration, a Student Body card which will admit him to all activities controlled by the Associated Students: athletic events — football, basketball, tennis and track — dramatics and musical entertainments, socials, lectures, etc.; will give him a copy of the yearbook if student body fee was paid for all quarters, and a subscription to the University newspaper. The system has been found to be a great saving to the students and an excellent means of fostering proper interest in student activities.

Deposit Required of Foreign Students. At the time of initial registration, students from other countries will be required to deposit with the University controller an amount of money equal to three quarters' tuition and fees (\$801). This money may be drawn out only at the beginning of the initial and succeeding quarters and only for payment of tuition and fees.

For a more detailed list of **Summer Quarter** fees consult Summer Quarter Catalog.

University Publications: General Catalog, \$1; Graduate Catalog, 50c; Class Schedule Bulletin, 25c.

Financial Assistance

General. Assistantships, both for teaching and research are generally available in most of the departments of the University. Utah State University conforms to the agreement made by most of the Graduate Schools of the United States to announce fellowship and scholarship appointments on April 1 and permit the student a two-week period in which to accept or reject.

Many students not receiving assistantships or fellowships receive financial assistance by working for departments on an hourly basis.

Assistantships

Teaching Assistantships. Students receiving these appointments assist with teaching in the departments. The contracts generally cover the period October 1 to May 31, or September 15 to May 31. The stipend varies from \$1,100 to \$2,400. The corresponding service load varies from one-third to one-half time. Maximum credit load for students on teaching assistantships is 12 credits.

Research Assistantships. These are subject to the same basic pattern for duration, service load, and stipend, but may be varied to meet the needs of the particular research program on which the student works. Maximum credit load for students on research assistantships is 12 credits, except that if the research is the student's thesis program, he may register for an additional 4 credits of thesis or research.

Fellowships

University Research Fellowships. These fellowships carry a stipend of \$3,000 and remission of nonres-

ident tuition. The student is required to participate successfully in a research project leading to a Master's thesis or Doctor's dissertation. These are tenable in any field in which USU grants an advanced degree. Application must be made by February 1, and awards are made April 1.

Traineeships. The University has traineeship programs supported by National Institutes of Health, National Science Foundation, and the National Aeronautics and Space Administration. The basic stipend is \$600 per quarter, with tuition and fees paid, and with additional for dependents and progression. Most of the major departments participate in these programs.

NDEA Fellowships. These fellowships are available at Utah State in Bacteriology, Botany, Chemistry, Civil Engineering, Education, Electrical Engineering, Industrial and Technical Education, Mechanical Engineering, Physics, Plant Science, Range Science, Soils and Meteorology, Wildlife Resources, and Zoology. They are for students who wish to become college and university teachers, and who will undertake a doctoral program. Basic stipend is \$600 per quarter with additional for dependents and progression and with tuition and fees paid.

Summer Fellowships for Graduate Teaching Assistants. These fellowships provided by the National Science Foundation are available to graduate teaching assistants at USU who can qualify. The stipend is as much as \$85 per week and fees.

Other Fellowships. The University also participates in the Graduate Fellowship Program of the

National Science Foundation and in the Fellowship Program of the National Institutes of Health. Additional fellowships are provided by private foundations and grants.

Tuition Waivers

Waiver of Nonresident Tuition Fee. The nonresident tuition fee may be waived by the President of the University for students holding graduate appointments, that is, graduate fellowship appointments awarded through the School of Graduate Studies or won by students in national competition, contractual arrangements with the University for standard teaching or research assistantships, and government or other types of contracts with the University. Students being paid only on University payroll do not ordinarily qualify for nonresident tuition waivers. Employers of graduate students on payroll may request waivers for single quarters if the level of pay is comparable with that of standard assistantships and stability through the quarter is guaranteed. A student who holds a nonresident tuition waiver must maintain a B average if the waiver

is continued from one quarter to the next.

Major professor or department head should recommend the waiver to the Dean of Graduate Studies, who may forward it to the President. Requests for waiver must be cleared with the Graduate Office at least two weeks before the beginning of the quarter in which the waiver is to become effective.

The nonresident tuition fee may also be waived for students of high scholarship (defined by the Graduate Council as a Grade Point average of at least 3.5 for the two most recent school years). This waiver is similarly initiated by a department head with a signed statement giving evidence of high scholarship, approved by the Dean of Graduate Studies, and recommended to the President.

Tuition Scholarships for Residents. Tuition scholarships are available to graduate students who are residents of Utah and have a record of superior scholarship (grade point average of 3.5 or above for the most recent two school years). Applications should be made to the Dean, School of Graduate Studies.

Admission

Application and Admission

Admission to the School of Graduate Studies is obtained only through filing of an application and formal acceptance by the Graduate Office. Two copies of the application form (one for the School of Graduate Studies and one for the department) are part of this catalog (buff-colored sheets inside back cover). This form can be detached and used to apply for admission to the Utah State University School of Graduate Studies.

The application form should be presented to the School of Graduate Studies, preferably at least 60 days in advance of the day of registration. The application form will not be accepted unless complete in all details, and accompanied by two official transcripts from all schools previously attended. A Utah State University graduate should request the Office of Admissions and Records to send two transcripts to the Graduate Office. The student should request letters of recommendation from the references named in the application.

When the letters of recommendation are received and the application is complete, the student's file is forwarded to the department concerned for its recommendation. If the student is accepted, a permit to register is sent to the student and a copy to the department.

A graduate with a Bachelor's degree from USU or from any other accredited college or university may be admitted to the School of Graduate Studies if: (1) he is recommended by a department for an advanced degree program and (2) he meets the scholastic requirements

of the School of Graduate Studies. A *B* average in the most recent two years of academic work is necessary for admission to the School of Graduate Studies.

Transition from Bachelor's Program. A senior at Utah State University who lacks not more than 6 credits for the completion of his Bachelor's degree at the beginning of any quarter may enter the School of Graduate Studies provided the 6 credits are completed that quarter. Two copies of a form showing the division of courses between the undergraduate and graduate program, signed by the student's major professor, his undergraduate dean, and the Dean of Admissions and Records, must accompany the student's application for admission. This transitional program is permitted only for students who have an average of *B* or better in their courses in the junior and senior years.

Matriculated Graduate Students

Those admitted without restriction to the graduate program are classified as matriculated graduate students.

Qualifying Examinations. A qualifying examination is required by the School of Graduate Studies and may be taken prior to registration. The aptitude test of the Graduate Record Examination, which is the qualifying examination required, is administered by the Educational Testing Service several times each year on the Logan campus and in other locations throughout the world. Entering students in areas for which the Graduate Record

Examination provides an advanced test must also take this test unless excused by the department head.

If not taken before registration, the Graduate Record Examination and/or any other qualifying examination required by the major department must be taken as soon as possible after registration. Results of these examinations become a part of the student's file in the Graduate Office.

All students applying for admission to the Master of Business Administration program must take the Admissions Test for Graduate Study in Business, rather than the Graduate Record Examination. This examination is also offered by the Educational Testing Service and is given four times annually on a national basis.

Students entering the Doctor of Education program must take the Advanced Test in Education of the Graduate Record Examination.

Departments and/or major professors may require other examinations, written or oral, to test the qualifications of entering students.

Application for Candidacy. As soon as the supervisory committee has met and agreed upon the course program to be followed by the student, and upon a thesis topic, three copies of the application for candidacy form should be completed by the student. He will obtain the signatures of his department head and supervisory committee members and file the application for candidacy in the Graduate Office, together with a thesis statement.

The application for candidacy should be completed by the Master's degree candidate as early in the graduate program as possible and must be filed before the end of the second quarter of graduate work.

A doctoral student should meet

with his committee as early as possible to determine requirements for his individual program and should file an Application for Candidacy when the committee has delineated these requirements. A committee for a doctoral candidate may wish to consider the Statement for Thesis Problem at a later meeting, and this statement may be filed after the candidacy application.

In the Doctor of Education program the application for candidacy form is not filed until the student has successfully passed the written comprehensive examination and the defense of dissertation problem.

Nonmatriculated Graduate Students

A student holding a baccalaureate degree awarded by Utah State University or another accredited institution may be classified as a non-matriculated student and be granted permission to register for either undergraduate or graduate courses. Most commonly, the reasons for this classification are:

1. The student is not working on a graduate degree program but is taking courses to meet teacher certification requirements or for other reasons.

2. A complete application for admission to the graduate school has not been submitted or was submitted too late for adequate consideration.

3. Departmental recommendation which may stipulate certain prerequisite courses or additional data before reconsideration of the application for classification as a graduate student.

4. Disapproval of a departmental recommendation by the Dean of the Graduate School because of low

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grade point average or other deficiency. (A grade point average of 3.0 for the most recent two years of academic work is the usual minimal standard for admission to a degree program.)

5. Negative recommendation from the department. (In such cases the applicant may choose to take courses as a nonmatriculated student with no real or implied status in a graduate degree program.)

Students might become fully admitted in the Graduate School at a later date by meeting the requirements stipulated by the academic department and/or the graduate school. The requirements vary with the individual case, but in many instances they might be met by:

1. Consideration of the credentials by the department and a positive recommendation given (for the late applicant).

2. Completion of at least one quarter (12 hours minimum) of graduate or equivalent work with a 3.0 or higher grade point average in a course of study acceptable to the department. This basis for re-

consideration is reserved for those students who have received a positive recommendation from the department.

3. The course work or quarter hour load stipulations made by the department have been met satisfactorily.

Students registering in the non-matriculated category who desire to enter a degree program should seek informal counseling with departmental representatives for guidance in selecting courses which may be significant in meeting the requirements for obtaining graduate status or a graduate degree. A maximum of 15 credits earned as a non-matriculated student may be approved by a department or a supervisory committee toward a graduate degree.

As long as the student is not matriculated, his adviser will be appointed by the dean of his academic college or the head of his department. The School of Graduate Studies will provide assistance and advice.

Registration

A registration packet is made up for a graduate student by the Office of Admissions and Records upon receipt of the green form (Application for Admission Part II) found in the back of this catalog. This green sheet is sent to the School of Graduate Studies with the rest of the application form and forwarded by the Graduate Office to the Office of Admissions and Records after the student has been accepted by the department and School of Graduate Studies.

This green part of the application form must be resubmitted if a student drops out of school for a quarter or more.

Advisers and Supervisory Committees

When a student enters the School of Graduate Studies he should seek the assistance of the head of the department of his interest in obtaining an adviser who can assist him with the selection of a course

until a supervisory committee is appointed. If the student's grades are satisfactory for a quarter, and he otherwise shows promise of succeeding at his program, the head of the department will suggest to the Dean of Graduate Studies that a supervisory committee be appointed for the student. The committee will be appointed with not less than three members for Master's candidates and five members for doctoral candidates. The designated chairman of the committee then becomes the student's adviser. A supervisory committee will not be appointed until all entrance procedures have been satisfactorily completed.

When the student's research is best supervised by a federal collaborator, or other person who is not a member of the regular teaching staff, such collaborator or other person may be designated as thesis director. This thesis director is a member of the student's committee.

If a committee member should be unable to serve on an oral examination, a new (or substitute) member is recommended by the head of the department and approved by the dean of the School of Graduate Studies.

Grades

Graduate students are expected to do superior work, and in general, to maintain an average of *B* or better. The student's supervisory committee may accept the grade of *C* if it sees fit. Grades below *C* constitute failure in the course.

Staff members are authorized to use the grade *P* (passed) for seminar, special problems, and thesis classes.

All incomplete (*I*) grades for course work must be removed from the student's record before the final examination can be set. It is the

student's responsibility to see that *I* grades for thesis are removed before the May 15 deadline.

Credit Load

Recommended maximum load for full-time graduate students is sixteen credits. Maximum for assistants engaged in teaching or research is twelve credits, except that students assisting in research which results in their thesis or dissertation may register for the full load, if such registration includes at least four credits of research or thesis.

Continuing Graduate Advisement

Any graduate student at the University using the Library, laboratory or other University facilities and/or under faculty supervision for the completion of a degree program must register each quarter for a minimum of three (3) credits.

If the student does not enroll in regular courses, seminars, independent study or thesis for the minimum of three credits, he must register for "Continuing Graduate Advisement" (department designation course number 400) to make a minimum enrollment of three credits. Students who have received maximum thesis credit, but who have not completed the thesis or dissertation, must enroll for a minimum of three credits. A student must be registered during the quarter in which he completes his degree requirements. If the student does not comply, his candidacy will be suspended and his supervisory committee terminated.

Time Limit

Work for a graduate degree must be completed within six years from the date of matriculation as a reg-

ular student in the School of Graduate Studies. Older work may be revalidated by examination. Statements signed by the student's committee and department head specifying action taken on particular outdated courses must be submitted to the Graduate Office for approval before such courses can be used to fulfill the requirements for a degree.

Residence Requirements

The resident requirement for the Master's degree permits a maximum of 18 credits of off-campus credit to be used in the program, exclusive of thesis, off-campus meaning courses taken in the resident instruction centers of the University. A minimum of 15 credits must be taken on the Logan campus. In Education a minimum of 27 credits inclusive of thesis must be taken on the Logan campus.

In the Doctor of Education program, a minimum of four quarters of residence on the Logan campus is required, three of which must be in consecutive sequence. In the Doctor of Philosophy program a minimum of one year of residence beyond the Master's degree is required.

Extension Course Credit

The amount of extension class or other off-campus credit to be allowed will be determined in consideration of the entire course pro-

gram. As stated above, the total of all off-campus credit may not exceed 18 credits exclusive of thesis. All extension courses for which graduate credit is sought must be regularly registered for through the School of Graduate Studies, and must have the sanction of the head of the department in which graduate work is being done. Credit toward a Master's degree is not granted for home study (correspondence) courses.

Transfer Credit

Up to nine credits of graduate work may be transferred from another approved graduate school as part of a Master's program. An exception is made for the inter-university curriculum in engineering science.

In the doctorate program, the supervisory committee may require that part of the program be taken at another university, in which case the credit for this part will be transferred from the other institution to Utah State at the completion of the degree program.

Thesis Credit in Absentia

Where the student's program calls for work on the thesis, away from the campus, the student must register each quarter, as required by the program, for thesis in absentia. The cost for this is the registration fee and the tuition fee only, all other fees not assessed.

Student Responsibility

Graduate students are expected to know the requirements and standards of their programs and departments, and to assume full responsibility for meeting them. Staff members may not assume any part of this responsibility. It is the student's responsibility to see that all necessary forms are properly executed and filed in the Graduate Office. Major professors, supervisory

committee chairmen, and other officers of the University do not undertake specifically to call regulations to the attention of students. It is the student's responsibility to inform himself. In no case will a rule be waived or an exception made simply because a student pleads ignorance of it or asserts that he was not informed of it by his adviser or the Graduate Office.

Summary of Deadlines

All Graduate Students

Important deadlines for all graduate students are the following:

End of First Quarter of Study. Completion of all admission procedures. Delay beyond this time will seriously hinder the student's program.

Time Limit. The credits presented must not be older than six years. Older work may be revalidated by examination.

End of Winter Quarter. Applications for candidacy, including thesis statement, must be filed and approved by this time for students who will graduate at the next commencement.

Two Weeks before Final Examination. A typewritten copy of the thesis must be submitted to each member of the advisory and examining committee at least two weeks before the date of the final examination.

April 15. Application for graduation must be on file in Graduate Office for all who will graduate at

the following commencement. This application bears the student's name as it will appear on the diploma. It is the basis for ordering the diploma.

April 15. Final examination must be completed for all who will graduate at the following commencement.

May 1. Thesis (in four copies) must be completed and in the Graduate Office. Students are referred to the Thesis Procedure Checklist inside back cover of *Handbook for Preparing Dissertations, Reports and Theses*.

Doctoral Candidates

Doctoral candidates have the following additional deadline:

Spring Quarter before Last Year of Doctoral Program. Language requirements should be completed.

Fall Quarter Preceding Graduation in Doctoral Program. Comprehensive doctorate examination must be successfully completed at least five months before graduation.

Commencement

Advanced degrees are awarded at the annual commencement exercises, generally the first week of June. Graduates are urged to attend if possible, but attendance is not required. About May 1 all students who have completed their programs and others likely to do so will receive an announcement of the commencement dates, together with

reservation blanks for printed announcements and academic dress.

Students who wish to participate in the baccalaureate services and commencement exercises must be at the designated meeting place in academic costume, one-half hour before the procession is scheduled to begin. Latecomers may be barred from the procession.

Graduate News and Comment

Graduate News and Comment is published quarterly by the School of Graduate Studies at USU. Its purpose is to provide news, infor-

mation, views and opinions of interest to graduate students and faculty.

Library

Interlibrary Loans. The practice of Interlibrary Loans has long been recognized as a necessary adjunct to the more direct service functions of the USU Library to graduate students. Such loans supplement the library's resources by making available for research materials located in other libraries and not owned or available by purchase by the borrowing library.

Interlibrary Loan service is a courtesy and a privilege, not a right; it is dependent upon the cooperation of many libraries. Because of the cost to the library of the service (estimated at five dollars per item) and the conflict in demands for certain classes of materials, the Interlibrary Loan Service is restricted to requests that cannot be filled by any other means.

Before an Interlibrary Loan is requested, an awareness of the following points is essential:

1. Many of the titles requested involve complex entries and foreign languages which must be verified and complete before a request can be forwarded to any other library.

2. Libraries are reluctant to loan periodicals and have arrangements for making photocopies which must be purchased. As the charge is ascertained per page, total and exact pagination of an article must be known.

3. After a request is mailed, sufficient time must be allowed to locate the book if the request is placed through the Bibliographical Center (this is necessary except in the case of theses, which are borrowed directly from particular schools). Time is also required for the lending library to go through all the details of handling a book to be charged out to Interlibrary Loans, and additional time in the mails is required. Usually the entire pro-

cess takes from ten days to two weeks. There are times, however, when a month or more is required.

4. The length of time a patron may keep the borrowed item is determined by the *lending* library.

5. If an extensive study is undertaken here at USU, it is required of the one doing the study to consult with the Reference Librarian as to details and extent of borrowing privileges that will be needed, as the expense may be excessive. The expense of each item is too high to permit a student beginning graduate work to borrow extensively merely to make a survey of what has been done.

6. Masters' theses are usually available through loan terms but doctoral dissertations must now be purchased on microfilm, and become the permanent property of the University Library.

Descriptors Aid Research. New IBM listings in the Library will make available an in depth record of theses and dissertations by adding

descriptors to the traditional author and title categories.

Graduate Study Carrels. Individual study carrels with lockers are located throughout the Library. Graduate students interested in being assigned one of these carrels may apply to one of the divisional librarians.

Visiting Scholar Program. A Visiting Scholar Program has been arranged between the institutions of higher education in Utah. Under its provisions graduate students may be issued a permit to do work in the libraries of the University of Utah, Brigham Young University, and Weber State College. A recommendation for such use is issued from the office of the Librarian permitting the student free use of library materials and limited borrowing privileges from other institutions. Recommendations are not issued until local resources have been exhausted and when inter-library services are inadequate to meet the graduate's needs.

Housing

Prospective students are invited to direct their applications and inquiries regarding housing to Coordinator of Student Housing, Utah State University, Logan, Utah.

University-owned housing includes apartment-living residence halls and room-and-board residence halls for single women, apartment-living residence hall and room-and-board residence halls for men, and University apartments for married students. A University Trailer Court provides accommodations for private trailers. A \$25 application fee is required when applying for University-owned housing. Priority

lists are based on date of application.

Seven residence halls built by The Church of Jesus Christ of Latter-day Saints provide facilities for 504 USU students. These halls are group-living units where six students live together in a fully equipped apartment. For information and application forms, write to: Manager, LDS Student Living Center, Utah State University, Box 220, Logan, Utah.

Students desiring off-campus housing may procure the current housing list upon arrival at the University, Room 103, Main Building.

Degree Requirements

Master of Science and Master of Arts

MAJOR AND MINOR

The Master's degree is awarded for work done in a major field with a supporting minor in one or more related subjects approved by the committee. The supervisory committee, which is appointed by the head of the major department and approved by the dean of the School of Graduate Studies, will represent both the major and minor fields. In exceptional instances, the major and minor may be in the same department though involving different subjects.

COURSE REQUIREMENTS

The minimum requirements for the Master's degree is 45 credits in courses numbered 100 or above, approved by the student's super-

visory committee, as constituting an acceptable program. At least 10 credits must be in courses numbered 200 or above; these 10 credits are included in the total of 45 credits but do not include thesis credit. In the Departments of Elementary Education, Educational Administration, Secondary Education and Special Education, 25 credits in courses in the 200 series are required.

See also pages 21-22 for additional information concerning credit which can be applied toward graduate degrees. Other requirements may be indicated by the specific department.

LANGUAGE REQUIREMENT

Candidates for the Master of Arts degree only must have two years of foreign language or equivalent competency.

THESIS REQUIREMENT

A thesis statement should be submitted to the Graduate Office at the same time application for candidacy is made. This statement should briefly indicate the origin and nature of the problem, objectives of the investigation, and methods of procedure.

A candidate for a Master's degree usually must present a thesis on a topic within the field of his major subject, which represents from 9 to 15 hours of credit. The thesis must be a contribution to the field of knowledge, based upon the student's own research or a treatment and presentation of known subject matter from a new point of view.

A handbook designed to help the graduate student prepare his thesis, dissertation, seminar paper, or Plan B report has been published by the USU School of Graduate Studies and may be purchased at the Bookstore. A "Thesis Procedure Check List" is presented inside the back cover of this *Handbook for Preparing Dissertations, Reports and Theses*.

The major professor or thesis director will supervise the preparation of the thesis. When it is written in good form, grammatically and structurally correct, the major professor will sign, thus certifying that it is properly organized and written in good English. After the major professor has approved the thesis, copies will be submitted to other members of the committee at least two weeks before the final oral examination. The student is responsible for revisions following the final committee meeting and obtaining all signatures on the title page. Four copies of the signed and fully approved thesis must be deposited in the Graduate Office. Af-

ter binding is completed, two of these copies will be deposited in the Library, another sent to the department, and the fourth returned to the student.

Thesis Abstract. In addition to the abstract which is included with each of the four official copies of the thesis, another copy of the abstract is submitted to the School of Graduate Studies for publication.

Thesis Alternate. The supervisory committee may permit the substitution of one or two advanced reports, valued at 3 to 10 credits, for the regular Master's thesis. These are generally known as "Plan B" reports (or as seminar reports in the MEd program and master's papers for the MIE degree). The Master's program is otherwise the same under "Plan B." In certain specialized programs, no thesis or "Plan B" papers are required.

Plan B reports should follow the same general form as set forth for theses in the thesis handbook published by the USU School of Graduate Studies and available in the bookstore.

Four copies of the Plan B reports (seminar reports or master's papers) are required as with the theses. However, all B-plan reports, recitals, problems and projects will be bound in a blue color to distinguish them from the theses and dissertations reporting research, which are bound in black.

FINAL EXAMINATION

The final examination for candidates receiving degrees at the June Commencement must be given by April 15. A form on which supervisory committee members may indicate that they approve the thesis (or reports) as presented, and are willing to participate in a final examination at the time proposed

by the chairman, must be circulated by the student and returned to the Graduate Office at least three days before the examination. The Dean of Graduate Studies designates a chairman for the examination and approves the place where it will be held.

Master of Education

The basic minimum requirements for this degree are the same as those for the Master of Science degree with these exceptions:

1. In lieu of a thesis, one seminar report upon a subject agreed upon by the faculty advisory committee. Four copies of each seminar report are deposited in the Graduate Office as with a thesis.

2. A minimum of 27 hours course work taken on the Logan campus. Nine hours in course work taken in designated residence centers may be counted as part of these 27.

Master of Fine Arts

This is a specialized professional degree considered as the terminal degree for those engaged in the fine arts graduate program. A minimum of four quarters in residence, or approximately 60 credits is required of all candidates. However, a two-year period is generally required to complete the necessary work.

Inasmuch as the program for the MFA is highly individualized, the student should consult with the department concerning requirements.

Master of Business Administration

The MBA degree is open to qualified graduate students regardless of their undergraduate major. Two-year and one-year programs are

offered. The two-year program is established for undergraduate majors in engineering, psychology, sociology, forestry, liberal arts, and other disciplines outside of business, and consists of approximately 90 credits.

The one-year program is established for students who majored in business at the undergraduate level, and consists of approximately 45 credits. The one-year program is the same as the second year of the two-year program.

The first year (the Basic Program) of the two-year program is to provide the student skills and knowledge in the areas of statistics, mathematics, economics, accounting, production, finance, distribution and human relations necessary to successfully handle the Advanced Program or second year curriculum. Students previously trained in any of these areas will be exempted from taking course work in the Basic Program which duplicates prior academic training.

Candidates must comply with regulations of the School of Graduate Studies and meet the following departmental requirements.

1. The one- and two-year programs are included on page 62 of this catalog. Students must take all specified course work unless their supervisory committee determines their undergraduate preparation is sufficient to exempt them from course work in the Basic Program. The entire Advanced Program is required of all students.

2. Two options are offered in the MBA program. (1) The student may either complete a thesis (Plan A) or two Plan B reports under the direction of the supervisory committee, or (2) he may take a three-course sequence which results in the completion of two business

reports. The course sequence is as follows:

BA 230, Business Research Methods3 credits
BA 231, Business Problems I3 credits
BA 232, Business Problems II3 credits

Master of Industrial Education

Requirements include:

1. A minimum of 45 quarter hours of credit beyond the Bachelor's degree. At least 10 of the 45 hours must be in the 200 series. A core program required for this degree is listed on page 132.

2. A scholarly piece of work designated as a Master's Paper which carries no credit.

3. A background of successful teaching, supervisory, or administrative experience and a valid teaching certificate in either Industrial Arts, Trade and Industrial or Technical Education.

Master of Forestry

This degree program is available to students possessing a nonforestry Bachelor's degree with acceptable scholarship. The minimum requirements include the completion of 45 credits in the basic sciences of chemistry, physics, mathematics, botany and soils; 42 credits in specified forestry courses; and 10 credits of graduate (200 series) course work. Part of these requirements may have been satisfied during the student's undergraduate course work.

Master of Landscape Architecture

Requirements for this degree include:

1. The MLA Degree is the professional terminal degree in Landscape Architecture and Environmental Planning as established by

the American Society of Landscape Architects. It constitutes a one and a half to two-year program including 60 credits in two hundred series courses.

2. Holders of Bachelor's degrees in allied fields may become candidates for the MLA if they satisfactorily complete, or have completed, 45 hours of credit in Landscape Architecture at the upper division level.

3. A thesis of 10 to 15 hours credit is required, the precise hours being determined jointly by the candidate and the faculty, depending upon the complexity and scope of the chosen subject.

4. The level at which students enter into the graduate program will be determined by an evaluation of their past background and experience.

5. Certain upper division and graduate courses will be required in allied fields, particularly if the candidate chooses to take a Master of Science in Environmental Planning, which encompasses a broader approach to design problems, rather than the MLA.

Master of Music

This degree offers advanced specialized training both in musical performance and in the teaching of Music. It is attained through completion of a course of study which is planned to increase the candidate's understanding of the art of performance and the art of successful music teaching. Candidates for this degree must show evidence of being either unusually gifted performers or competent teacher-performers of music. Students may elect a recital or a thesis project. If the thesis project is elected in lieu of the recital it must deal with some aspect of music teaching and

make a significant contribution to the improvement of the creative teaching process. The student may select a course of study leading to a major in Music Education or a major in Applied Music.

Each candidate must successfully complete an examination for admission to the program of graduate study in music. This examination may be taken under the supervision of a proctor at a college or school designated by the University Department of Music and near the candidate's place of residence.

Civil Engineer and Irrigation Engineer

The program for these degrees includes:

1. A minimum of six quarters of study, of which at least three quarters must be in residence at USU.
2. Completion of 90 credits of approved courses.
3. Completion of at least 30 credits in 200 series courses, exclusive of thesis.
4. Completion of an adequate thesis based on a research program for which a maximum 30 credits may be allowed.

Specialist Programs in Education

Specialist in Educational Administration. Requirements include:

1. Master's degree or equivalent.
2. A total of 45 credit hours beyond the Master's degree. This includes specifically required and recommended courses and some professional and interdisciplinary elective courses.
3. At least one quarter of full-time residence on the Logan campus.
4. Satisfactory completion of a written comprehensive examination.

5. Meeting course requirements of the Utah State Department of Public Instruction for General Administration Certificate. Students with previous preparation in elementary education will be required to present 12 quarter hours of credit in secondary education. Those previously prepared in secondary education, must present 12 quarter hours in elementary education.

Specialist in Education. A program leading to a Specialist in Education degree is offered. It requires one full year of work beyond the Master's degree and is planned to include additional work in Education and Psychology.

Doctor of Philosophy

MAJOR AND MINOR REQUIREMENT

The PhD degree represents high scholarly achievement demonstrated by independent research and competence in a major and a minor field approved by the supervisory committee. Approximately two-thirds of the time and credit should be devoted to the major field. The minor may be divided between two suitably related areas, or may be a Master's degree in a suitably related field.

COURSE REQUIREMENTS

At least three years of full-time graduate study above the Bachelor's degree or two years past the Master's degree is necessary. Requirements include a minimum of 135 approved graduate credits, or 90 credits in addition to the Master's degree. Approximately half of these 90 credits may be devoted to research and thesis.

See also pages 21-22 for information concerning grades, credit load, continuing graduate advisement, time limit, and thesis credit in absentia. The Doctor of Philoso-

phy program requires at least one full year of residence at USU.

SUPERVISORY COMMITTEE

The student's program of study is subject to approval by a supervisory committee, usually comprised of five members. The committee is appointed by the head of the department and approved by the dean of the School of Graduate Studies. This committee, representing the major and minor fields, is responsible for the qualifying examinations, approval of the course of study, approval of the dissertation, and the final oral examination.

LANGUAGE REQUIREMENT

A reading knowledge of at least one modern language other than English is required in the PhD program. Normally one of the languages of global scientific or scholarly communication—French, German, Russian, Spanish—will be selected according to the candidate's particular need. The requirement of a second modern foreign language is optional with the department in which the major is to be taken.

Testing and certification of language proficiency will be performed by the faculty of the Department of Languages on the basis of courses completed and/or performance in language proficiency exams offered to eligible applicants semiannually (in November and in April). The required language proficiency should be demonstrated before the beginning of the third year of graduate work.

DISSERTATION REQUIREMENT

When the plan for the dissertation research is determined by the candidate and approved by his supervisory committee, a dissertation statement is filed in the Grad-

uate Office. The dissertation should represent a contribution to the field of knowledge based upon the student's research.

The doctoral candidate is referred to the *Handbook for Preparing Dissertations, Reports and Theses*, available in the University bookstore, for information concerning presentation of the dissertation to meet standards required by Utah State University. Attention is particularly drawn to the "Thesis Procedure Check List" inside the back cover of the Handbook.

As with Master's thesis, the dissertation must be written in good form, properly organized, and be grammatically and structurally correct before it is approved by the major professor and presented to the other members of the supervisory committee for consideration. The committee should receive the dissertation at least two weeks before the final oral examination. The student is responsible for revisions following the final committee meeting and obtaining all signatures on the title page. Four copies of the signed and fully approved thesis must be deposited in the Graduate Office. After binding is completed, two of these copies will be deposited in the Library, another sent to the department, and the fourth returned to the student.

A dissertation which is to be presented in partial fulfillment of an advanced degree may not be published prior to acceptance for the School of Graduate Studies.

EXAMINATIONS

Admission examinations as discussed on page 18 are required for entrance into the doctoral program. Other examinations include:

Comprehensive Doctorate Examination. This examination should be

taken in the student's sixth or seventh quarter of graduate work. It must be successfully completed at least five months before graduation. The examination is prepared by the supervisory committee and administered under the supervision of the Dean of Graduate Studies. All parts of the examination must be taken within two consecutive weeks. The examination is graded and evaluated by the supervisory committee and a written report of the results becomes a part of the student's record.

Final Doctorate Examination. This examination in defense of the dissertation must be completed by April 15. A form on which supervisory committee members may indicate that they approve the dissertation as presented, and are willing to participate in the final examination at the date proposed by the chairman, must be circulated by the student at least three days before the examination and returned to the Graduate Office with all signatures. The Dean of Graduate Studies will designate a chairman and the place of the examination.

Doctor of Education

A summary of the requirements for the Doctor of Education degree is as follows:

1. A Master's degree or equivalent.
2. A program of at least 90 credits of approved graduate study beyond the Master's degree. This includes specifically required and recommended courses and some professional and interdisciplinary elective courses. The program is approved by a supervisory committee usually comprised of five members. (See page 31.)
3. Possession of a valid teaching or administrator's certificate.

4. Three years of successful experience as a professional educator prior to admission.

5. Development of a high level of competency in a major area of specialization and a broad understanding of the over-all field of education.

6. A wide-range selection of interdisciplinary course work.

7. Satisfactory evidence of ability to write, such as a Master's thesis or other scholarly paper.

8. An acceptable dissertation for which a maximum of 18 credits may be given.

The information presented under the "Dissertation Requirement" for the Doctor of Philosophy degree would also apply to the Doctor of Education candidate.

9. Four quarters of residence at Utah State University, three of which must be in consecutive sequence (minimum 12 hours per quarter).

EXAMINATIONS

Comprehensive Doctor of Education Examination. This written examination is given after the student has completed a minimum of 45 credits of work beyond the Master's degree. This examination will be prepared by the Department and administered by the School of Graduate Studies.

Defense of Dissertation Problem, Doctor of Education. In this interview the candidate will be called upon to present a review of the literature pertinent to his dissertation and a detailed outline of the dissertation plan. It is given after the student has successfully passed the written comprehensive education examination. The final examination in defense of the dissertation is conducted in the same manner as for other doctoral candidates.

Courses and Research In the Graduate Program

Courses in the graduate program at Utah State University are printed here under the appropriate college and department. A course listed in the 100 series may become part of a student's degree program provided: (i) the course has not been taken in the undergraduate curriculum, (ii) the course does not exceed the number of hours credit allowed in the 100 series, and (iii) the course is approved by the student's supervisory committee.

Courses taught specifically for graduate students are numbered in the 200 series. In the College of Education and some other fields, courses generally reserved for

doctorate students are numbered in the 300 series.

Any graduate student pursuing an advanced degree at the University using the Library, laboratory or other University facilities and/or under faculty supervision for the completion of a degree program must register each quarter for a minimum of three (3) credits. Students who have received maximum credit, but who have not completed the thesis or dissertation must enroll in "Continuing Graduate Advisement" (department designation course number 400), until the degree is completed.

Interdepartmental Curriculums

Interdepartmental Curriculum in

Ecology

ACTING DIRECTOR, UTAH STATE UNIVERSITY CENTER OF ECOLOGY: JOHN M. NEUHOLD, PhD, Utah State University

OFFICE: Forestry-Zoology 225

Ecology Council

KEITH L. DIXON, Professor of Zoology; PhD, University of California

ROBERT H. KRAMER, Leader, Utah Cooperative Fishery Unit; PhD, University of Minnesota

FRANK B. SALISBURY, Professor and Head, Department of Plant Sciences; PhD, California Institute of Technology

FREDERIC H. WAGNER, Professor of Wildlife Resources; PhD, University of Wisconsin

NEIL E. WEST, Assistant Professor of Range Science; PhD, Oregon State University

34 *Interdepartmental Curriculum*s

The Utah State University Center of Ecology was created on July 15, 1966 by the President and Board of Trustees of Utah State University. The objectives of the Center are designed to coordinate research and teaching programs in ecology on the Utah State University campus.

Historically ecology developed in several areas on the Utah State University campus. Some form of plant ecology training or research developed in the Departments of Range Science, Botany, and Forest Science. Animal ecology developed in the Departments of Wildlife Resources and Zoology. Courses in environmental influences developed in the Departments of Geology and Soils and Meteorology.

The creation of the Center of Ecology allowed the development of an interdepartmental curriculum in ecology pooling the resources of the seven departments. It is now possible to earn graduate degrees in plant ecology in the Departments of Range Science, Botany and Forest Science and animal ecology in the Departments of Wildlife Resources and Zoology. The development of a degree in paleoecology in the Department of Geology is contemplated in the near future.

A competence in ecology requires background in a large number of disciplines. Although ecologists usually have had their primary training in biology, they must also have some understanding of geology, soils, meteorology, chemistry, physics and statistics. To provide this background, the following courses should be completed in the undergraduate program or early in graduate study: college algebra, trigonometry (and if possible calculus), two quarters of applied statistics, general chemistry and organic chemistry, physics (one year),

general botany, general zoology, plant taxonomy, genetics, plant ecology and animal ecology.

Applicants for the MS degree in plant ecology are in addition required to show credit for Soil Survey and Classification (Soils 114), and Plant Physiology (Bot 120) and a minimum of five courses from those listed below including two from group A.

Applicants for the PhD in plant ecology must meet the requirements for the MS and show credit for an additional three courses from the list below including one course each from groups A and B.

Applicants for the MS in animal ecology are required to show credit for an upper division course in animal physiology and five courses from the list below including two from group B.

Applicants for the PhD in animal ecology must show credit for three additional courses beyond the MS including one each from A and B.

A research thesis is required for all degrees.

For listing of specific courses refer to the department headings.

Group A. Plant Ecology

RS 210 Plant Autecology
RS 211 Plant Synecology
RS 215 Plant Geography
RS 221 Ecophysiology
Bot 121 Plant Water Relations
Bot 200 Evolutionary Ecology
FS 204 Forest Ecology
RS 212 Vegetation Analysis

Group B. Animal Ecology

WLR 148 Animal Behavior
WLR 260 Animal Population Ecology
WLR 262 Fish Population Theory
Zoo 106 Insect Ecology
Zoo 233 Zoogeography
Zoo 260 Environmental Vertebrate Physiology¹

Group C. Supporting Courses

Bot 224 Plant Growth and Development
Bot 228 Photosynthesis

¹Proposed Course

Chem 180 or 190 Biochemistry
 FS 220 Forest Autecology
 FS 221 Forest Synecology
 FS 222 Forest Ecosystem Analysis
 Geology 115 Surficial Geology
 Geology 212 Paleocology
 Met 125 Bioclimatology
 Soils 155 Chemical Edaphology

Soils 165 Physical Edaphology
 WLR 161 Limnology
 WLR 166 Aquatic Ecology
 WLR 248 Analysis of Animal Behavior
 Zoo 113 Insect Physiology
 Zoo 123 Endocrinology
 Zoo 132 Mechanics of Evolution
 Zoo 151 Comparative Physiology

Interdepartmental Curriculum in

Economics

CHAIRMAN OF INTERDEPARTMENTAL PROGRAM: B. DELWORTH
 GARDNER, Professor of Agricultural Economics; PhD, University of
 Chicago

OFFICE: Agricultural Science 250

ROICE H. ANDERSON, Professor of Agricultural Economics; PhD, Cornell Uni-
 versity

LEONARD J. ARRINGTON, Professor of Economics; PhD, University of North
 Carolina

GEORGE T. BLANCH, Emeritus Professor of Agricultural Economics; PhD,
 Cornell University

RONDO A. CHRISTENSEN, Associate Professor of Agricultural Economics; PhD,
 Cornell University

ROBERT P. COLLIER, Professor of Economics and Dean of College of Business
 and Social Sciences; PhD, Stanford University

LYNN H. DAVIS, Professor of Agricultural Economics; PhD, Oregon State
 University

REED R. DURTSCHI, Associate Professor and Head of Economics; PhD, Uni-
 versity of Washington

GARY B. HANSEN, Assistant Professor of Economics; MS, Utah State Uni-
 versity

JACK F. HOOPER, Assistant Professor of Range Science; PhD, University of
 California

VERNON L. ISRAELSEN, Emeritus Professor of Economics; PhD, University of
 Wisconsin

BARTELL C. JENSEN, Associate Professor of Economics; PhD, Purdue Uni-
 versity

ELLIS W. LAMBORN, Associate Professor of Agricultural Economics; PhD,
 Cornell University

ALLEN D. LEBARON, Associate Professor of Agricultural Economics; PhD,
 University of London

KENNETH LYON, Assistant Professor of Economics; MS, University of Chicago

GLENN F. MARSTON, Associate Professor of Economics; MS, University of
 Utah; doctoral work, University of Washington

EARNEST M. MORRISON, Professor of Agricultural Economics; MS, University
 of California

36 *Interdepartmental Curriculums*

EVAN B. MURRAY, Emeritus Professor of Economics; MS, Utah State University

DARWIN B. NIELSEN, Assistant Professor of Agricultural Economics; PhD, Oregon State University

N. KEITH ROBERTS, Professor and Head of Agricultural Economics and Director, Economics Research Institute; PhD, University of Kentucky

ROGER A. SEDJO, Assistant Professor of Economics; MS, University of Illinois

E. BOYD WENNERGREN, Professor of Agricultural Economics; PhD, Pennsylvania State University

ROSS S. WHALEY, Associate Professor and Head of Forest Science; PhD, University of Michigan

Collaborators: CLYDE E. STEWART, PhD; JAY C. ANDERSON, PhD

The Interdepartmental Program is provided by combining the resources of the Departments of Economics and Agricultural Economics. The Colleges of Engineering and Natural Resources provide additional support. The research program is supported by the Agricultural Experiment Station, the Economics Research Institute, and the Utah Water Research Laboratory. Strong support is obtained from the Computer Center.

Strong areas of course study and thesis research are available in economic theory, agricultural economics, quantitative economics, economic history, public finance and monetary and fiscal analyses.

Doctor of Philosophy Degree Requirements. The student must meet the requirements for admission to candidacy and pass the Final Thesis Examination.

A student shall be admitted to candidacy upon completion of the following four requirements.

1. Successful performance on the preliminary examinations as follows:

a. Successful performance on a written core examination covering basic price theory and basic income and employment theory.

b. Successful performance on a written preliminary examination in the area of quantitative economics.

c. Successful performance on any two written preliminary examinations, at least one of which must be chosen from a list of fields of concentration as offered by the Program not including the field of quantitative economics. One field may be chosen outside the areas covered by the Interdepartmental Program.

2. Complete the following distribution requirements:

Demonstration of competence in at least five fields as offered in the Program in addition to the fields covered in the preliminary examinations. Competence may be shown by graduate credit with a grade of C or better in a course of at least three quarter credits.

3. Demonstrate reading knowledge of one foreign language.

4. Prepare a thesis prospectus and obtain approval of the same at a seminar composed of the Interdepartmental Faculty.

After being admitted to candidacy, the student will prepare a thesis and will be examined on the thesis by the entire Interdepartmental Faculty.

For a listing of course offerings see Agricultural Economics under College of Agriculture and Economics under College of Business.

Interdepartmental Curriculum in

Food Science and Technology

CHAIRMAN OF INTERDEPARTMENTAL PROGRAM: D. K. SALUNKHE,
Professor of Food Science and Industries; PhD, Michigan State University
OFFICE: Agricultural Science 312

BRUCE H. BYLUND, Associate Professor of Sociology; PhD, Pennsylvania State University

SPENCER H. DAINES, Associate Professor of Civil Engineering; MS, Kansas State University

CARROLL I. DRAPER, Professor of Animal Science; PhD, Iowa State University

C. A. ERNSTROM, Professor of Food Science and Industries; PhD, University of Wisconsin

RUSSELL M. HOLDREDGE, Associate Professor of Mechanical Engineering; PhD, Purdue University

YUN KIM, Assistant Professor of Sociology; PhD, Australian National University; postgraduate work at Population Research Center, Princeton University and United Nations Demographic Research Center, Bombay, India

ELLIS W. LAMBORN, Associate Professor of Agricultural Economics; PhD, Cornell University

JESSOP B. LOW, Leader, Utah Cooperative Wildlife Research Unit; PhD, Iowa State University

DOYLE J. MATTHEWS, Professor of Animal Science; PhD, Kansas State University

ELROY C. McDERMOTT, Assistant Professor of Business Administration; PhD, Montana State University

DEE R. MORGAN, Professor of Food Science and Industries; PhD, University of Wisconsin

L. E. OLSON, Assistant Professor of Plant Science; PhD, University of Illinois

FREDERICK J. POST, Associate Professor of Bacteriology and Public Health; PhD, Michigan State University

GARY H. RICHARDSON, Professor of Food Science and Industries; PhD, University of Wisconsin

JOSEPH C. STREET, Professor of Animal Science; PhD, Oklahoma State University

HARRIS O. VAN ORDEN, Professor of Biochemistry; PhD, Massachusetts Institute of Technology

ETHELWYN B. WILCOX, Professor and Head, Department of Food and Nutrition; PhD, Iowa State University.

A graduate program in Food Science and Technology leading to Master of Science or Doctor of Philosophy degree is available to outstanding students. Facilities of

the several departments conducting research in Food Science and Technology have been made available in this curriculum to afford students maximum opportunity to gain ex-

38 *Interdepartmental Curriculums*

perience and training. Included in the facilities are an Animal Metabolism Building, Meats Research Laboratory and equipment for conducting digestion and metabolism studies on large and small animals; several research laboratories are equipped with instruments such as the electron microscope, spectrography, ultracentrifuge, electrophoresis, gas chromatography, refrigeration, processing pilot plants, respiratory meters, and standard laboratory equipment.

Prerequisites for a major toward an advanced degree should include chemistry (qualitative, quantitative, organic, and elementary biochemistry), mathematics (college algebra, geometry, and a year of calculus for PhD candidate), in addition, appropriate courses in botany, plant pathology, zoology, physiology, bacteriology, public health, English composition, agriculture foods, sociology and economics.

Master of Science Degree Requirements

Course	Credits
Science, Technology and Economic courses (related to research and specialization)	10
Advanced Biochemistry and/or Organic Chemistry (190 and any advanced courses numbered 200 or above)	6
Applied Statistics 131, 132, 215	12
Physical Chemistry 101	3
Quantitative Chemistry 115	5
Food Microbiology 120, 121	4
Research and Thesis (maximum)	15

Doctor of Philosophy Degree Requirements (Beyond MS degree requirements)

Science, Technology and Economics (related to research and specialization)	15
Advanced Biochemistry and/or Organic Chemistry (190 and any advanced courses numbered 200 and above)	12
Applied Statistics 131, 132, 133, 13, 141, 233	12
Physical Chemistry 101 or 104, 105, 106	3 to 9
Biophysics (140, 141) and/or Radiobiology 143	3 to 9
Intermediate Quantitative Chemistry 152 and Instrumental Analysis 153	7
Food Microbiology 120, 121 or others	4
Research and Thesis (maximum)	45

Chairmanship for the curriculum rotates biennially; D. K. Salunkhe is chairman for 1968-69.

Interdepartmental Curriculum in

Nutrition and Biochemistry

CHAIRMAN OF INTERDEPARTMENTAL PROGRAM: ETHELWYN B. WILCOX, Professor and Head, Department of Food and Nutrition; PhD, Iowa State University

OFFICE: Family Life 111

JAY O. ANDERSON, Professor of Animal Science; PhD, University of Maryland

JOHN E. BUTCHER, Professor of Animal Science; PhD, Utah State University

C. ANTHON ERNSTROM, Professor and Head, Food Science and Industries; PhD, University of Wisconsin

DELBERT A. GREENWOOD, Professor of Biochemistry and Pharmacology; PhD, University of Chicago

LORIN E. HARRIS, Professor of Animal Science; PhD, University of Illinois; postdoctoral work, University of Adelaide, South Australia and Rowett Research Institute, Scotland

DELOY G. HENDRICKS, Assistant Professor of Food and Nutrition; PhD, Michigan State University

GEORGE E. STODDARD, Professor and Head, Department of Dairy Science; PhD, University of Wisconsin

JOSEPH C. STREET, Professor of Animal Science; PhD, Oklahoma State University

HARRIS O. VAN ORDEN, Professor of Biochemistry; PhD, Massachusetts Institute of Technology; postdoctoral work, University of Utah

Facilities of the several departments conducting nutrition and biochemical research have been made available in this curriculum to afford students maximum opportunity to gain experience and training in the biochemistry of human and animal nutrition.

Major problems currently being studied are effects of toxic and non-toxic substances on digestion and metabolism of farm animals, atmospheric pollution, cholesterol metabolism, amino acid metabolism, and other basic physiological processes related to nutrition.

Training in the curriculum is designed as preparation for research in educational institutions, governmental and industrial laboratories, and for college teaching.

Prerequisites for a major in the curriculum include basic training in English, chemistry, mathematics, physics, bacteriology, botany, physiology, and zoology. For specific requirements for the MS or PhD degrees, write the curriculum chairman. Any deficient prerequisite work must be completed without graduate credit.

Master's Degree Requirements

Course	Credits
Advanced Nutrition	10

Advanced Biochemistry	10
Statistics	8
Electives and Research	17-21
Total	45-49

Doctorate Degree Requirements

Advanced Nutrition	18
Advanced Biochemistry	20
Statistics	12
Physical Chemistry	One Year
Physiology, Zoology, Pathology	20
Electives and Research	67
Total	137

A student shall spend at least two-thirds of his time for the doctorate degree, including thesis, on the major subject. The minor must be in an area of work which can be logically related to that of the department in which the student is doing his major work.

Appropriate minors are Mathematics, Statistics, Chemistry, Physics, Physiology, Genetics and other fields closely related to the major.

For more specific details concerning admissions, requirements, and available scholarships and fellowships write the curriculum chairman.

Chairmanship for the curriculum rotates each two years; chairman for 1968-69 is Dr. Ethelwyn B. Wilcox.

Interdepartmental Curriculum in

Plant Nutrition and Biochemistry

CHAIRMAN OF INTERDEPARTMENTAL PROGRAM: R. L. SMITH,
Professor and Acting Head, Department of Soils and Meteorology; PhD,
University of California at Los Angeles

OFFICE: Agricultural Science 148

KEITH R. ALLRED, Professor of Agronomy; PhD, Cornell University
ORSON S. CANNON, Professor and Head, Botany and Plant Pathology; PhD,
Cornell University

GEORGE W. COCHRAN, Professor of Plant Pathology and Virology; PhD,
Cornell University

GENE W. MILLER, Professor of Plant Physiology; PhD, North Carolina State
College

FRANK B. SALISBURY, Professor and Head of Plant Science; PhD, California
Institute of Technology

D. K. SALUNKHE, Professor of Food Science and Industries; PhD, Michigan
State University

HARRIS O. VAN ORDEN, Professor of Biochemistry; PhD, Massachusetts Insti-
tute of Technology

DAVID R. WALKER, Professor of Pomology; PhD, Cornell University

GEORGE W. WELKIE, Associate Professor of Plant Pathology and Virology;
PhD, University of Wisconsin

HERMAN H. WIEBE, Professor of Plant Physiology; PhD, Duke University

Facilities of the various depart-
ments conducting research in Plant
Nutrition and Biochemistry have
been made available for this pro-
gram. This includes plant growth
chambers, laboratories equipped
with equipment such as an electron
microscope, ultracentrifuge, refrig-
erated centrifuges, spectrophoto-
meters for ultra violet, infrared
visible, fluorescence and recording
studies, chromatography equip-
ment, Warburg apparatus, scaling
and counting meters, electro-
phoresis apparatus and general
laboratory equipment.

Prerequisites for a major in this
curriculum include Botany (general
and plant physiology), Chemistry
(qualitative, quantitative, and or-
ganic), Mathematics (including one
year of geometry and calculus) and
Physics. Any deficiency must be

completed before an individual is
accepted as a candidate for a grad-
uate degree.

Master's Degree Requirements

Course	Credits
Botany	
1 course (102, 116, 117, 118, 125, 130, 150, 212, 230)	3-5
1 course (121, 221, 222, 224, 225, 226, 227, 228)	3-4
Chemistry	
2 courses (190, 191, 192)	6
1 course (101) ¹	3
Zoology	
Genetics 112	5
Mathematics 99	5
Graduate Seminar (3 quarters)	3
Research	9-15

¹Students are encouraged to follow the PhD
curriculum if they are anticipating receiving
a PhD at this University. The reason for this
is the difference in the Physical Chemistry
requirement.

Doctorate Degree Requirements
(after BS program)

Course	Credits
Botany	
1 course (102, 116, 117, 118, 125, 130, 150, 212, 230)	3-5
3 courses (121, 221, 222, 224, 225, 226, 227, 228)	9-12
Chemistry	
Physical Chemistry 104, 105, 106	9
Advanced Biochemistry (190, 191, 192, 295)	14

Zoology

Genetics 112	5
1 course (Zoology 212, Physiology 130, Chemistry 287 or Chemistry 153)	3-5
Seminar	3
Research	Maximum 45

Chairmanship for the curriculum rotates; R. L. Smith is chairman for 1967-69.

Interdepartmental Curriculum in

Toxicology

CHAIRMAN OF INTERDEPARTMENTAL PROGRAM: MERTHYR L. MINER, Professor and Head, Department of Veterinary Science; DVM, Iowa State University; postdoctoral work, University of Minnesota

OFFICE: Veterinary Science 105

THOMAS L. BAHLER, Professor of Physiology; PhD, University of Wisconsin
JOSEPH T. BLAKE, Associate Professor of Veterinary Science; PhD and DVM, Iowa State University

WILLIAM A. BRINDLEY, Assistant Professor of Entomology; PhD, Iowa State University

ORSON S. CANNON, Professor and Head, Department of Botany; PhD, Cornell University

C. ELMER CLARK, Assistant Director, Agricultural Experiment Station and Associate Professor of Animal Science; PhD, University of Maryland

LEGRANDE C. ELLIS, Associate Professor of Physiology; PhD, Oklahoma State University

THOMAS M. FARLEY, Assistant Professor of Chemistry; PhD, University of Wisconsin

ELDON J. GARDNER, Dean, School of Graduate Studies, Professor of Zoology; PhD, University of California

DELBERT A. GREENWOOD, Professor of Biochemistry and Pharmacology; PhD, University of Chicago

DATUS M. HAMMOND, Professor and Head, Department of Zoology; PhD, University of California

WILLIAM T. HELM, Associate Professor of Wildlife Resources; PhD, University of Wisconsin

DAVID W. HENDRICKS, Associate Professor of Sanitary Engineering; PhD, University of Iowa

TING H. HSIAO, Assistant Professor of Entomology; PhD, University of Illinois

JOHN M. NEUHOLD, Professor of Wildlife Resources; PhD, Utah State University

HOWARD B. PETERSON, Professor of Irrigation; PhD, University of Nebraska

D. K. SALUNKHE, Professor of Food Science and Industries; PhD, Michigan State University

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JAMES L. SHUPE, Professor of Veterinary Science; DVM, Cornell University; Pathology Residency, Walter Reed Medical Center, A.F.I.P.

WILLIAM F. SIGLER, Professor and Head, Department of Wildlife Resources; PhD, Iowa State University

DONALD V. SISSON, Associate Professor of Applied Statistics and Computer Science; PhD, Iowa State University

JOSEPH C. STREET, Professor of Animal Science; PhD, Oklahoma State University

Collaborators

WAYNE BINNS, Research Veterinarian; DVM, Iowa State University

LYNN F. JAMES, Research Scientist, Animal Disease and Parasite Research Division Laboratory, PhD, Utah State University

RICHARD F. KEELER, Research Chemist; PhD, Ohio State University

ROBERT H. KRAMER, Leader, Utah Cooperative Fishery Unit; PhD, University of Minnesota

JESSOP B. LOW, Leader, Utah Cooperative Wildlife Research Unit; PhD, Iowa State University

HARVEY C. MILLAR, Water Research Chemist, Utah Water Research Laboratory; PhD, Iowa State University

KENT R. VANKAMPEN, Veterinary Pathologist; DVM, Colorado State University, PhD, University of California, Davis

The toxicology curriculum allows for the study of the deleterious effects of chemicals (plant, animal, insect, or man-made toxins) at the system, organ, tissue, or cell levels. It encompasses both biological and physical disciplines. This interdepartmental approach provides unique opportunity for advanced training in the broad field of toxicology with an emphasis in a chosen discipline.

Graduates in toxicology are prepared as research scientists in educational institutions, governmental and industrial laboratories, and for university teaching.

Extensive investigations of the effect of fluorine compounds on plants and animals, of the effect and mechanism of action of pesticides on animals, and of teratologic effects of poisonous plants have been made at this institution in recent years. Recent investigations have been on animal venoms, noxious air and water pollutants, carcinogens, allergens and toxins of plant and bacterial origin. These

toxicoses are studied in wild animals, game birds and fishes as well as in farm and laboratory animals.

Facilities for handling and housing all types of animals are available, either aquatic or terrestrial; wild or domestic. Modern laboratories are equipped to perform technical procedures in chemical and physical analyses, physiologic interpretations, ultracentrifugation, fluorescent tracing, radioactive isotopes, photography, tissue culture, histopathology and food technology.

Applicants for training in the curriculum may be students with MD and DVM degrees or with BS or MS degrees in Nutrition, Animal Science, Food Technology, Biological Sciences or Physical Sciences.

Courses which will be required of candidates will depend upon their previous training and area of interest. Students trained primarily in biological sciences may need to strengthen their knowledge of basic physical sciences and vice versa.

Students without medical degrees may need to strengthen their knowledge of pathology, physiology, and pharmacology.

The toxicology curriculum is at

present partially supported by an NIH Training Grant.

Chairmanship of the curriculum rotates on a three-year basis. Current chairman is Merthyr L. Miner.

Interdepartmental Curriculum in

Water Quality

CHAIRMAN OF INTERDEPARTMENTAL PROGRAM: NORMAN B. JONES,

Associate Professor of Civil Engineering; MS, University of California

OFFICE: Engineering L-168

JAY M. BAGLEY, Professor of Civil Engineering and Director, Utah Water Research Laboratory; PhD, Stanford University

A. ALVIN BISHOP, Professor and Head, Agricultural and Irrigation Engineering; PhD, Colorado State University

THOMAS M. FARLEY, Assistant Professor of Chemistry; PhD, University of Wisconsin

WILLIAM T. HELM, Associate Professor of Wildlife Resources; PhD, University of Wisconsin

DAVID W. HENDRICKS, Associate Professor of Civil Engineering; PhD, State University of Iowa

JOHN M. NEUHOLD, Professor of Wildlife Resources and Acting Director, Ecology Center; PhD, Utah State University

HOWARD B. PETERSON, Professor of Agricultural and Irrigation Engineering; PhD, University of Nebraska

FREDERICK J. POST, Associate Professor of Bacteriology and Public Health; PhD, Michigan State University

WILLIAM F. SIGLER, Professor and Head, Wildlife Resources; PhD, Iowa State University

The Interdepartmental Program in Water Quality combines the resources of the Departments of Agricultural and Irrigation Engineering, Bacteriology and Public Health, Chemistry, Civil Engineering, and Wildlife Resources. Additional support, particularly for the research program, is provided by the Utah Water Research Laboratory, the Center for Water Resources Research, and the Center for Pollution Research.

The curriculum is designed to in-

volve graduate students from all pertinent disciplines associated with the major beneficial uses of water. The primary objective is to develop professional and competent people, at both the MS and PhD levels, who will be water quality specialists, possessing a breadth of understanding of the general scientific and technological context in which they must work.

A strong interdisciplinary emphasis is maintained in each student's academic program and research

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topic through the requirement of a minimum core of course work outside of his major department and a multi-discipline graduate committee. Upon successful completion of the program, degrees will be awarded by the department in which the student is enrolled.

The program is currently sup-

ported, in part, by a United States Department of Interior, Federal Water Pollution Control Administration Training Grant. Interested students may apply for fellowships covering tuition, fees and a stipend. Director of the FWPCA Training Grant Program is N. B. Jones.

College of

Agriculture

DEAN: VEARL R. SMITH, PhD, University of Minnesota

ASSISTANT DEAN: DOYLE J. MATTHEWS, PhD, Kansas State University

OFFICE: Agricultural Science 223

Graduate students may earn advanced degrees in specialized fields in the Departments of Agricultural Economics, Agricultural Education, Animal Science, Dairy Science, Plant Science, and Soils and Meteorology. Several USU departments cooperate to offer advanced degree programs in Nutrition and Biochemistry, in Food Science and Technology, in Plant Nutrition and Biochemistry, and in Toxicology.

Curricula and research leading to an advanced degree either on the Master's degree or Doctor's degree level are supervised by a Graduate Committee appointed by the Dean of the School of Graduate Studies. Staff members of the major department and of closely related

departments serve on these committees. All study and research programs must be approved by such a committee before admittance to candidacy for an advanced degree. The study and research program for a particular degree must also satisfy the requirements listed in Part I of this catalog.

Graduate Assistantships and Fellowships. A number of excellent graduate assistantships and scholarships are available in all departments giving graduate work. Assistantships are available both for teaching and research. Part-time employment is also available in research. Students should apply directly to the department concerned.

Department of

Agricultural Economics

HEAD: N. KEITH ROBERTS, Professor; PhD, University of Kentucky

OFFICE: Agricultural Science 230

ROICE H. ANDERSON, Professor; PhD, Cornell University; postdoctoral work, Stanford University

GEORGE T. BLANCH, Emeritus Professor; PhD, Cornell University

LYNN H. DAVIS, Professor; PhD, Oregon State University

B. DELWORTH GARDNER, Professor; PhD, University of Chicago

LEON C. MICHAELSON, Professor and Extension Specialist; EdD, Cornell University

EARNEST M. MORRISON, Professor; MS, University of California; doctoral work, University of Illinois and North Carolina State

MORRIS H. TAYLOR, Professor and Extension Specialist; PhD, University of Wisconsin

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E. BOYD WENNERGREN, Professor; PhD, Pennsylvania State University
RONDO A. CHRISTENSEN, Associate Professor; PhD, Cornell University
LLOYD A. CLEMENT, Associate Professor and Extension Specialist; MAP, Harvard
PAUL R. GRIMSHAW, Associate Professor and Extension Specialist; MS, Utah State University
ELLIS W. LAMBORN, Associate Professor; PhD, Cornell University
ALLEN LEBARON, Associate Professor; PhD, University of London
DARWIN B. NIELSEN, Assistant Professor; PhD, Oregon State University
Collaborators: CLYDE E. STEWART, PhD; JAY C. ANDERSON, PhD

Master of Science Degree. There are excellent facilities in the Department for graduate study in several divisions of Agricultural Economics such as: Agricultural Business Management, Farm Management, Resource Economics, Agricultural Finance, and Agricultural Marketing. Research in these areas is conducted by the Department Staff and the Federal Collaborators, with the assistance of graduate students.

Doctor of Philosophy Degree. Requirements for the doctorate degree are shown in the Interdepartmental Curriculum in Economics.

Agricultural Economics Courses

GRADUATE AND UNDERGRADUATE COURSES

102. *Intermediate Farm Management.* Principles and practices associated with the successful operation of farms. Three lectures. (3F) **Morrison**

106. *Land Economics.* Economic principles underlying utilization, valuation and tenure of land and water. Attention given prevailing policies, methods and techniques involved in dealing with economic problems of land and water use. (3F) **Stewart**

112. *Agricultural Cooperatives.* Principles of cooperation; organization, operation and management of cooperative sales, purchasing, and service associations. (3Sp) **Anderson**

116. *Livestock Economics.* Application of farm management and agricultural marketing principles to the economic production of livestock and livestock products. (3F) **Lamborn**

121, 122. *Agricultural Statistics and Research Techniques.* An introduction to the research process in solving problems in Agricultural Economics. Emphasis will be placed on basic techniques used in collecting, analyzing and presenting research data. (4W, 4Sp) **Davis

131. *Agricultural Credit.* Principles of agricultural credit. Emphasis on problems and methods of financing agriculture. (3F) **Morrison**

150. *Special Readings.* Directed readings on selected problems for undergraduates. Credit arranged. (F, W, Sp, Su) **Staff**

155. *Law on the Farm.* A non-technical consideration of some legal rights, responsibilities and liabilities associated with the operation of a farming business. (3F) **Morrison**

163. *Intermediate Agricultural Marketing.* Principles and functions of marketing and their application to the marketing of agricultural products. (3W) **Anderson**

170. *Farm and Ranch Appraisal.* An integrated presentation of the factors, principles and techniques used in determining the money value of farm and ranch properties. Two lectures, one laboratory each week. (3Sp) **Davis**

180. *Government and Agriculture.* A study of government in relation to selected economic problems, past and present, in agriculture. Emphasis is on the problems, the objectives of government action, the alternative proposals for action, action taken, and the results, so far as they can be interpreted. (3W) **Blanch**

186. *Land Problems and Appraisal.* The application of economic principles and techniques to the appraisal, conservation and development of land and water. (3W) **Anderson**

**Taught 1969-70

GRADUATE COURSES

200. **Advanced Production Economics I.** Economic principles and their application to specific production functions in agriculture. (5W) **Davis**

214. **Thesis.** Credit arranged. (F, W, Sp, Su) **Staff**

220. **Agricultural Production Economics II.** Theory of economic decision making as applied to production problems. Static and stochastic models. Effects of different decision criteria on optimization procedures. (3Sp) **Nielsen**

235, 236, 237. **Student and Faculty Seminar.** Required of all senior and graduate majors. No credit. (F, W, S) **Staff**

240. **Research Methodology.** Philosophy of research and importance of application of scientific method to solution of research problems. (2F) **LeBaron**

241. **Research Methodology.** Introduction to the similarities between statistical methods and the system by which scientists establish hypotheses and test hypotheses by means of experimental data. The relation of statistical theory to the design of experiments will be emphasized. Prerequisite Applied Statistics 171, 172, 173. (2Sp) **Nielsen**

250. **Special Problems.** Directed study on selected problems for graduates. Credit arranged. (F, W, Sp, Su) **Staff**

257. **Resource Economics.** Application of welfare and allocation theory to resource development. Evaluation of public investment decisions. Economic and philosophical implications implicit in the development of federal and state resource policy. (3Sp) **Gardner**

263. **Advanced Marketing.** Economic principles applied to the solution of agricultural marketing problems. (5F) **Lamborn**

265. **Agricultural Price Analysis.** Application of statistical techniques to derivation of agricultural supply and demand functions. Time series and cross sectional analysis, single and simultaneous equation estimation. (3W) **Staff**

280. **Agricultural Policies.** Application of economic principles and methods of analysis to the formulation and appraisal of agricultural policies and programs. (5Sp) **Morrison**

400. **Continuing Graduate Advisement.** Graduate students who have received maximum thesis credit, but who have not completed the thesis or dissertation, must enroll for a minimum of three credits, until the degree is completed. If the student does not comply, his candidacy may be suspended and his supervisory committee dissolved. (3F, 3W, 3Sp, 3Su.) **Staff**

Department of

Agricultural Education

HEAD: VON H. JARRETT, Associate Professor; PhD, University of Missouri
OFFICE: Agricultural Science 110

STANLEY S. RICHARDSON, Emeritus Professor; MS, University of Idaho; doctoral work, Ohio State University

Opportunity is offered for research and graduate study in Agricultural Education. Students planning to do graduate work should select a coordinated program of study in the Colleges of Agriculture and Education.

Agricultural Education Courses

GRADUATE COURSES

225. **Special Problems in Agricultural Education.** A consideration of needs and special types of service in FFA, Young Farmer and Adult programs. For upper division and graduate students. (2-5F, Sp) **Richardson**

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280. **Research and Thesis.** Credit Arranged.
(F, W, Sp, Su) **Staff**

281. **Seminar.** Studies and reports on research and new developments. **Staff**

290. **Special Problems for Agriculture Teachers.** For teachers of vocational agriculture who desire to develop a more practical program for future, young, and adult farmers. (2Su) **Staff**

291. **Special Problems.** For teachers who

participate in the Annual Summer Conference for Teachers of Vocational Agriculture. (2-5Su) **Staff**

400. **Continuing Graduate Advisement.** Graduate students who have received maximum thesis credit, but who have not completed the thesis or dissertation, must enroll for a minimum of three credits, until the degree is completed. If the student does not comply, his candidacy may be suspended and his supervisory committee dissolved. (3F, 3W, 3Sp, 3Su.) **Staff**

Department of

Animal Science

HEAD: JAMES A. BENNETT, Professor; PhD, University of Minnesota
OFFICE: Animal Science 307

JAY O. ANDERSON, Professor; PhD, University of Maryland

JOHN E. BUTCHER, Professor; PhD, Utah State University

C. I. DRAPER, Professor; PhD, Iowa State University

LORIN E. HARRIS, Professor; PhD, University of Illinois

DOYLE J. MATTHEWS, Professor and Assistant Dean of Agriculture; PhD,
Kansas State University

JOSEPH C. STREET, Professor; PhD, Oklahoma State University

C. ELMER CLARK, Associate Professor; PhD, University of Maryland

WARREN C. FOOTE, Associate Professor; PhD, University of Wisconsin

RUSSELL R. KEETCH, Associate Professor and Extension Specialist; MA,
Colorado State University

MILTON A. MADSEN, Associate Professor; PhD, University of Wisconsin

DARRELL H. MATTHEWS, Associate Professor; MS, Utah State University

HYRUM STEFFEN, Associate Professor; MS, University of Illinois

DON W. THOMAS, Associate Professor and Extension Specialist; DVM, Iowa
State University

DONALD C. DOBSON, Assistant Professor; PhD, Utah State University

Course work and research leading to the Master of Science and the Doctor of Philosophy degrees are offered. Specialized fields of study for the Master of Science and Doctor of Philosophy degree include: Animal Breeding, Nutrition, Physiology, and Management. Facilities are available to conduct research with farm animals, poultry, and laboratory animals. In cooperation

with other departments the Master of Science and Doctor of Philosophy degrees are offered in Nutrition and Biochemistry (See Interdepartmental Curriculum in Nutrition and Biochemistry).

Detailed information on graduate programs in Animal Science may be obtained from the department or from the Dean of the School of Graduate Studies.

Animal Science Courses

GRADUATE AND UNDERGRADUATE COURSES

****104. Poultry Physiology and Incubation.** A study emphasizing general morphology and function of physiological systems characteristic of the avian class with consideration given to principles of incubation and embryological development. Two lectures and one lab. (3Sp)

Clark

****105. Poultry Management.** Problems of locations of poultry farm, farm planning, renewing the flock and management problems of the growing, laying and breeding flocks. Prerequisite: Poultry 1. (2W)

Draper

***107. Applied Poultry Nutrition.** A study of the nutritive requirements of poultry, the composition of poultry feedstuffs, methods of feeding and formulation of rations for special needs. Prerequisite: A.H. 150, 151. (3Sp)

Anderson

***108. Poultry Products.** Problems in processing, grading, packaging, transporting, labeling, storing and marketing poultry products. (1F)

Draper

110. Beef Production. Factors involved in economical production of beef cattle, including organization of the enterprise, breeds of cattle, selection of breeding stock, production of maximum calf crop, handling and feeding animals of different ages on the range and in the feed lot, and marketing of surplus stock. Prerequisite: AH 152. (3F, Sp)

Madsen

120. Swine Production. Systems of production, with emphasis on those suited to western conditions. Breeding, management and feeding of the breeding herd, and of market swine. Prerequisite: AH 152. (3W)

Steffen

123. Special Readings in Animal Science. Selected readings to meet student needs. Available to upper division majors and by permission of department head and instructor. Credit arranged. (F, W, Sp, Su)

Staff

125. Sheep Production. Range and farm sheep, with emphasis on range production. Methods of production of lambs and wool, grading and marketing practices, feeding and studies of the breeds and their adaptation to the different husbandry practices. Prerequisite: AH 152. (3Sp)

Madsen

126. Seminar. Current literature studies, assigned problems and special topics. (1W)

Staff

142. Physiology of Reproduction. A study of the Physiology of reproduction in mammals. Prerequisites: Zoology 16 or equivalent, Physiology 4, or Veterinary Science 20, and a

course in organic chemistry; Physiology 141 recommended. Two lectures, one lab. (3W)

Foote

150, 151. Animal Nutrition. Basic principles of the metabolism of nutrients and nutrient requirements of farm animals; nutritional diseases; and a consideration of investigational methods. Prerequisite: Chemistry 12 or concurrent registration. (3F, 3W)

Street

152. Applied Animal Nutrition. Compositions of feeds and adaptability to different species of farm animals; nutrient deficiencies and their correction through feeding, feeding systems for farm animals and feed formulation. Prerequisite: AH 151. (3Sp)

Butcher

155. Animal Breeding. Application of genetics to improvement of farm animals. Breeding systems, inheritance problems, fertility and sterility in larger farm animals. Prerequisite: Vet Sci 20, Zoology 112. Three lectures. (3Sp)

Bennett

160. Livestock Production Problems. Attention is given various problems in livestock production, especially in Utah. Prerequisite or concurrent registration: AH 152 and 155. (3Sp)

Staff

165. Livestock Judging and Selection. Animal form and its relation to function. Emphasis on evaluation of live animals in terms of their probable value of production of meat, wool or work. Emphasis on judging for both commercial and show ring purposes. The livestock Judging Team is selected from students taking this course. Prerequisite: AH 2. Three labs. (3F)

Madsen

175. Wool Technology. Marketing and manufacturing of wool and laboratory techniques used in studying wool. Methods of grading, scouring and measuring length, diameter, crimp, density, tensile strength and other characteristics. Prerequisite: AH 125. (3W)

Madsen

185. Meats. Cutting, selection, and identification of wholesale and retail cuts of beef, pork and lamb, with references to prices, relative economy, uses, nutritive value, chemical composition, and palatability. Preparation of meats for the home freezer is emphasized. (3W)

Matthews

GRADUATE COURSES

****210. Techniques in Nutrition Research.** An original project is completed with the primary objective being to orient one on how to plan, conduct, and summarize research in animal nutrition. Prerequisite: AH 151. (2-6F, W, Sp)

Harris

*Taught 1968-69

**Taught 1969-70

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****214. Advanced Animal Nutrition.** The measures for nutritional value of feed, nutrient requirements of animals, and the cause, detection, treatment and prevention of nutritional diseases. Prerequisite: AH 151. (3W) **Harris**

***215. Nutritional Laboratory.** Review and practice in laboratory techniques used in nutrition research. Two labs. (2F) **Street**

220. Special Problems in Animal Science. Selected readings, discussions, lectures, literature reviews and research problems dealing with animal breeding, nutrition, physiology and management. Available to students of graduate standing and by permission of the instructor. Credit arranged. (F, W, Sp, Su) **Staff**

250. Research and Thesis. Research connected with problems undertaken in animal science for partial fulfillment of requirements for the Master of Science or Doctor of Philosophy degree. Credit Arranged. (F, W, Sp, Su). **Staff**

261. Animal Nutrition Seminar. Special emphasis will be given to discussions of topics related to animal nutrition. May be repeated. (1F, 1W, 1Sp) **Staff**

262. Animal Breeding Seminar. Special emphasis will be given to discussion of topics

related to animal breeding. May be repeated. (1W) **Staff**

263. Animal Management Seminar. Special emphasis will be given to discussion of topics related to the management of livestock. May be repeated. (1Sp) **Staff**

264. Animal Physiology Seminar. Special emphasis will be given to discussion of topics related to reproductive physiology. May be repeated. (1F, 1W, 1Sp) **Staff**

270. Nutrition and Biochemistry Seminar. Reports and discussion of topics of current interest and importance by students, staff, and guest speakers. Philosophy of research and technical information are included. Area of coverage rotates each quarter. Course enrollment may repeat each quarter. (1F, W, Sp) **Staff**

400. Continuing Graduate Advisement. Graduate students who have received maximum thesis credit, but who have not completed the thesis or dissertation, must enroll for a minimum of three credits, until the degree is completed. If the student does not comply, his candidacy may be suspended and his supervisory committee dissolved. (3F, 3W, 3Sp, 3Su.) **Staff**

*Taught 1968-69

**Taught 1969-70

Department of

Dairy Science

HEAD: GEORGE E. STODDARD, Professor; PhD, University of Wisconsin
OFFICE: Animal Science 106

LLOYD R. HUNSAKER, Professor and Associate Director of Extension Services; PhD, University of Minnesota

VEARL R. SMITH, Professor and Dean, College of Agriculture; PhD, University of Minnesota

JOHN J. BARNARD, Associate Professor and Extension Dairyman; MS, University of Wisconsin

CLIVE W. ARAVE, Assistant Professor; PhD, University of California

CHARLES H. MICKELSEN, Assistant Professor; MS, Utah State University

Collaborators: MELVIN J. ANDERSON, PhD; ROBERT C. LAMB, PhD.

The Dairy Science Department offers a Master of Science degree in Dairy Production and, in cooperation with other departments, offers

both MS and PhD degrees in the Interdepartmental Curriculum in Nutrition and Biochemistry.

Dairy Courses

GRADUATE AND UNDERGRADUATE COURSES

****112 Feeding Dairy Cattle.** Characteristics of standards and feeding systems. Economy and comparative value of feeds on irrigated farms. Prerequisite: AH 150, 151. (3W)

Stoddard

****102. Dairy Cattle Research and Breeding.** Studies of the inherited characteristics of dairy cattle to be considered in selecting breeding stock. Breeding programs and systems in use. Breeds of dairy cattle, breed organizations and their programs, testing plans, pedigree analysis, record keeping and study of breeding establishments. Prerequisite: Zoology 112. (5W)

Arave

***121. Milk Secretion.** Anatomy and function of the mammary gland, theories of secretion, methods of milking, mastitis control, factors affecting composition, quality and quantity of milk. Prerequisite: Organic Chemistry. (3W)

Smith

122. Dairy Herd Management and Operation. Dairy herd management, land-livestock balance, operational efficiencies, herd improvements, new developments and trends, and

critical analysis of dairy literature. Student discussions and reports. (Open to graduate students in Dairy Science by permission of instructor.) (3Sp)

Stoddard

GRADUATE COURSES

215. Seminar. Discussions and reports of current literature and research reports by students. At least three quarters required of all dairy students. (1F, 1W, 1Sp)

Staff

220. Research in Dairy Industry. Credit arranged. (F, W, Sp, Su)

Staff

254. Special Problems in Dairy Industry. Credit arranged. (F, W, Sp, Su)

Staff

Nutrition and Biochemistry Seminar. (See Animal Husbandry 270.)

400. Continuing Graduate Advisement. Graduate students who have received maximum thesis credit, but who have not completed the thesis or dissertation, must enroll for a minimum of three credits, until the degree is completed. If the student does not comply, his candidacy may be suspended and his supervisory committee dissolved. (3F, 3W, 3Sp, 3Su.)

Staff

*Taught 1968-69

**Taught 1969-70

Department of

Plant Science

(Agronomy, Crop Science, Food Technology, Ornamental Horticulture, Pomology, Vegetable Crops)

HEAD: FRANK B. SALISBURY, Professor; PhD, California Institute of Technology; postdoctoral work, Universities of Tübingen and Innsbruck

OFFICE: Agricultural Science 322

KEITH R. ALLRED,¹ Professor; PhD, Cornell University

WADE G. DEWEY, Professor; PhD, Cornell University

ALVIN R. HAMSON, Professor; PhD, Cornell University

DEVERE R. MCALLISTER, Professor; PhD, Iowa State University

LEONARD H. POLLARD,² Professor; PhD, University of California

DELMAR C. TINGEY, Emeritus Professor; MS, Utah State University; doctoral work, University of Minnesota

DAVID R. WALKER, Professor; PhD, Cornell University; postdoctoral work, Oak Ridge Institute of Nuclear Studies

¹On assignment in Bolivia.

²On leave in Iran.

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J. LAMAR ANDERSON, Associate Professor; PhD, University of Wisconsin
WILLIAM F. CAMPBELL, Associate Professor; PhD, Michigan State University
REX F. NIELSON, Associate Professor; MS, Utah State University
JOHN O. EVANS, Assistant Professor; PhD, University of Minnesota
Collaborators: DOUGLAS R. DEWEY, PhD; A. C. HULL, PhD; ALBERT M. MURPHY, MS; MARION W. PEDERSEN, PhD; MYRON STOUT, MS; J. CLAIR THEURER, PhD

Master of Science Degree. The Department, in cooperation with related departments, offers Master of Science programs in Plant Breeding, Crop Physiology, Crop Production and Management, Weeds and Weed Control, and Plant Nutrition.

Doctor of Philosophy Degree. The Department, in cooperation with related departments, offers the degree of Doctor of Philosophy in Plant Nutrition, Crop Management, Plant Breeding, and Crop Physiology. Detailed information may be obtained from the Department or from the Dean of School of Graduate Studies.

Plant Science Courses

GRADUATE AND UNDERGRADUATE COURSES

100. Propagation, Pruning, and Grafting. A practical course for all students in the University, dealing with the science and art of pruning and grafting of horticultural plants. Methods of asexual propagation will be considered. Special emphasis is placed on fruit trees, but small fruits and ornamental trees and shrubs are also included. (3W) **Walker**

103. Forage Crops. Alfalfa, clovers, grasses and other farm forages, classification and methods of production, harvesting and storage; meadow and pasture management. The place of forage crops in rotations and soil conservation is considered. Three lectures, one lab. Prerequisites: Botany 26, Plant Sc. 2 (majors). (4Sp) **McAllister**

****104. Vegetable Production.** Principles and practices underlying production of vegetable crops, varieties, fertilizers, pest control, harvesting, storage, and processing of vegetables. Emphasis will be placed upon culture of the major vegetable crops. Three lectures. (3Sp) **Hamson**

105. Turf Management. Kinds of turf grasses, their fertility and management, for home lawns, golf courses and athletic fields. (2Sp) **Evans**

107. Grain Crops. The classification, history, and cultural methods involved in the production of grain crops. Two lectures, one lab. Prerequisite: Plant Science 2 (majors). (3W) **Evans**

108. Root and Miscellaneous Crops. Cultural methods, market grades and commercial possibilities of sugar beets, potatoes, tobacco, and other crops. Prerequisite: Plant Science 2 (majors). (3F) **McAllister**

****109. Plant Breeding.** Principles, techniques, and practices in breeding improved varieties of crop plants. Prerequisites: Zoology 112, Plant Science 2 (majors). (4W) **Dewey**

111. Ornamental Horticulture. A study of the aesthetic use of plants, including foliage plants and cut flowers for indoor use and landscape materials for enhancing the home and community. Topics are organized around the controlled-environment culture of florists crops (greenhouse management) and the propagation and nursery practices required to produce landscape materials (shrubs, trees, evergreens, and bedding plants). (3Sp) **Wesenberg**

****115. Dry Farming.** Principles of dry farming from practical and scientific standpoints, a survey of agricultural work in the Great Plains and the mountain regions, an analysis of the possibilities in typical climatic areas and on important soil types. Prerequisites: Plant Science 2 (majors), 107, and Soils 56. (2W) **McAllister**

117. Fruit Production. Principles and practices underlying production of trees and small fruits. Varieties, soils, sites, fertilizers, culture, pest control, harvesting, storage, propagation and stocks. Prerequisite: Plant Science 2 (majors). (3F) **Anderson**

118. Flower Arranging for the Home. Principles of design, care and use of floral materials in arrangements and corsages. House plant care. Lab fee required. (3F) **Wesenberg**

****Taught 1969-70**

119. Weed Science. Identification of weeds, the weed problems in agriculture, and methods of control. Three lectures, one lab. Prerequisite: Plant Science 2 (majors). (4F)

Anderson

***120. Seed Production.** Methods, problems and commercial production of field, vegetable and flower seeds in the Intermountain West. Prerequisites: Plant Science 2, Botany 26, or permission of instructor. (4F)

McAllister

131. Agricultural Sprays and Dusts. Preparation, properties, and uses of agricultural chemicals used in disease, insect, and weed control; application of fruit thinning, growth regulator, and nutritional sprays. Design, operation, and care of the application equipment. Jointly administered by the Departments of Botany, Plant Science, and Zoology. Prerequisites: Botany 130, Entomology 108, or special permission. Three lectures, two labs. (5Sp)

Anderson, Cannon, Davis

197. Special Problems. Conferences or laboratory investigations. Subject and credit arranged.

Staff

GRADUATE COURSES

***201. Hay and Pastures.** Recent advances in current problems related to the production and use of hay and pastures. Prerequisite: Plant Science 103 or equivalent. (3Sp)

Evans

***204. Advanced Vegetable Production.** Fundamental principles relating to technical horticultural practices in vegetable crop production, seed storage, growth and development, nutrition, water relations, temperature, light photoperiod, weed control and growth regulators. Prerequisite: Plant Science 104 (4W)

Hamson

***208. Advanced Field Crops.** Recent advanced in the improvement and production of cereal, potato and sugar beet crops. Prerequisites: Plant Science 107 and 108. (3W)

McAllister

***209. Advanced Plant Breeding.** A graduate course emphasizing the principles and theory underlying plant breeding, rather than procedures and methodology. Including discussion of quantitative inheritance, heritability, heterosis, interspecific crossing, mutation breeding, and others. Emphasizes recent developments and current trends. (3W)

Dewey

***217. Advanced Pomology.** Fundamental principles relating to horticultural practices;

growth and development, nutrition, water relations, fruit setting, dormancy and use of growth regulators in fruit production. Prerequisites: Botany 120 (or concurrent registration), organic chemistry, Plant Science 117. Three lectures, one lab. (4Sp)

Walker

***219. Biochemical Basis of Herbicidal Action.** Entrance, movement and metabolism of chemicals of herbicidal importance in plants. A critical study of the physiological processes which appear to be affected by the several classes of compounds used as herbicides. Prerequisites: Botany 120, Chemistry 190. (3Sp)

Evans

****222. Control of Reproduction in Plants.** A discussion of the ways in which flower, fruit, and seed production can be controlled in horticultural and agronomic crops, including the topics of vegetative propagation, vernalization, and photoperiodism. An emphasis upon principles and their application in modern agriculture. Prerequisite: Botany 120. (3Sp)

Salisbury

***260. Methods in Plant Science Research.** Research methods using chromatography, radioisotopes, experimental plot design and instrumental analysis. Prerequisites: Chemistry 122, Botany 120, Applied Statistics 132. One lecture, one lab. (2W)

Staff

297. Special Problems. Any quarter. Credit arranged. Registration by permission only.

Staff

298. Research and Thesis. Any quarter. Outlining and conducting research on farm crops and preparation of thesis. Credit arranged.

Staff

299. Graduate Seminar. Oral and written reports by graduate students. Registration required for all departmental graduate students. (1F, W, Sp)

Staff

400. Continuing Graduate Advisement. Graduate students who have received maximum thesis credit, but who have not completed the thesis or dissertation, must enroll for a minimum of three credits, until the degree is completed. If the student does not comply, his candidacy may be suspended and his supervisory committee dissolved. (3F, 3W, 3Sp, 3Su.)

Staff

*Taught 1968-69

**Taught 1969-70

Department of

Soils and Meteorology

ACTING HEAD: R. L. SMITH, Professor; PhD, University of California at Los Angeles

OFFICE: Agricultural Science 148

PAUL D. CHRISTENSEN, Professor and Extension Soil Scientist; PhD, Rutgers University

JEROME J. JURINAK, Professor; PhD, Utah State University

RAYMOND W. MILLER, Professor; PhD, Washington State University

GEORGE W. REYNOLDS, Professor; PhD, Texas A and M University

D. WYNNE THORNE, University Vice President and Professor; PhD, Iowa State University

GAYLEN L. ASHCROFT, Associate Professor; PhD, Oregon State University

BEN L. GROVER, Associate Professor; PhD, Iowa State University

ALVIN R. SOUTHARD, Associate Professor; PhD, Cornell University

LEMOYNE WILSON, Associate Professor; MS, Utah State University

Collaborators: JAY L. HADDOCK, PhD; E. ARLO RICHARDSON, MS

Collaborators stationed at Snake River Laboratory, Kimberly, Idaho: DAVID L. CARTER, PhD; JOHN W. CARY, PhD, MARVIN E. JENSEN, PhD, GLEN E. LEGGETT, PhD; HENRY F. MAYLAND, PhD; J. H. SMITH, PhD; JAMES L. WRIGHT, PhD.

Master of Science Degree. The Department, in cooperation with related departments, offers Master of Science programs in Soil Physics, Soil Chemistry, Soil Fertility, Plant Nutrition, Soil Genesis, Soils and Irrigation, Biometeorology and Climatology.

Doctor of Philosophy Degree. The Department, in cooperation with related departments, offers the Doctor of Philosophy degree in: Soil Physics, Soil Chemistry, Soil Fertility, Plant Nutrition, Soil Genesis, Soils and Irrigation, Biometeorology and Climatology. Detailed information may be obtained from the Department or from the Dean of the School of Graduate Studies.

Acceptance. Student applications, submitted to the School of Graduate Studies, for advanced study in

Soils and Meteorology are reviewed by a departmental committee. The applicant may be accepted without reservation, accepted on probation, accepted as a non-candidate, or rejected.

Students accepted on a probationary basis will not be assigned a research problem, given research credit, be assigned a graduate committee or considered for an assistantship until such probation has been removed as a result of academic excellence. This probationary status cannot be indefinite and is limited to two quarters. A probationary student who does not maintain *B* grades or better will not be permitted to continue in the department.

Fellowships and Traineeships. The Department has National Defense Education Act (NDEA) Fellowships and National Science

Foundation (NSF) Traineeships that are awarded on the basis of national competition.

Assistantships and Major Professors. Acceptance of a student to pursue graduate study does not grant him an assistantship or the right to study under a particular professor. Assistantships are awarded to accepted students by the professor having funds to cover specific research. Funds are not available to provide all students with assistantships. Some students who wish to do graduate work may be accepted if they do not desire financial assistance. Permission to study under a particular professor may be granted by the professor in question, after consultation with the student.

Program Direction. The graduate student's program is directed by a graduate committee consisting of his major professor and at least two other professors. The student and major professor may indicate a choice of committee members, but the final appointment is made by the Dean of the School of Graduate Studies.

Soils Courses

GRADUATE AND UNDERGRADUATE COURSES

105. **Soil Science.** Nature and composition of soils; colloidal behavior, soil reaction, solubility, ionic behavior and nature and properties of the interface. Suggested prerequisites: Soils 56, 58. (3F) **Miller**

106. **Soil Science Laboratory.** Laboratory methods in Soil Science. Prerequisites: Prior or concurrent registration in Soils 105 or approval of instructor. (1F) **Miller**

107. **Irrigated Soils.** Course designed to give teachers and students a knowledge of plant-soil-water relationships, fertilizers and soil fertility, soil salinity, water supply and water quality, soil surveys as related to farm and city planning. (3W) **Smith**

110. **Soil Microbiology.** See Bacteriology 110.

114. **Soil Survey and Conservation.** A study of soil morphology and of soil classification, survey, and conservation. Prerequisite: Agronomy 56 or 58. Two lectures, three labs. (5Sp) **Southard**

155. **Chemical Edaphology.** Plant and soil relations with respect to environment; nutrient availability, absorption, toxicity, fertilizers, and plant nutrition. Suggested prerequisite: Soils 56. (3W) **Miller**

156. **Chemical Edaphology Laboratory.** Methods of analysis of soils and plants. Prerequisites: Prior or concurrent registration in Soils 155 or approval of the instructor. (1W) **Miller**

165. **Physical Edaphology.** The physical relationships of soil moisture, temperature, penetrability, and aeration to plant growth. Mineralogical composition, structural conditions, tillage, irrigation, and other soil management practices are considered as factors that affect these relationships. Prerequisites: Soils 56, General Physics or Chemistry. (3F) **Staff**

166. **Physical Edaphology Laboratory.** Methods of analysis of the physical properties of Soils. Prerequisites: Prior or concurrent registration in Soils 165 or approval of instructor. (1F) **Staff**

167. **Physical Analysis of Soils. A laboratory course in Soil Physics. Prerequisite: Soils 165. (2W) **Staff**

*177. **Chemical Analysis of Soils.** A laboratory course in chemical analysis of soils and plants. Emphasis will be on the theory of analytical techniques and the operation of instruments available for the more usual analyses done in plant and soil research. Two laboratory periods. Prerequisite: Permission of the teacher. (2W) **Miller**

GRADUATE COURSES

212. **Seminar.** Review of current literature in soil science. Required of all graduate majors. (1F, W, Sp) **Staff**

*214. **Soil Physics.** A theoretical discussion of soil as a physical body. The structure of clay minerals and their relation to absorption and other surface phenomena; soil moisture and air relations; and soil stabilization are considered. Prerequisite: Soils 165. (3Sp) **Staff**

215. **Physical Chemistry of Soils. An advanced study concerning the physico-chemical,

*Taught 1968-69

**Taught 1969-70

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colloidal and surface aspects of soils and related systems. Prerequisite: Chemistry 106. (3W)

Jurinak

218. Special Problems. Students review literature on the problem and conduct experiments. Credit arranged. (F, W, Sp, Su)

Staff

219. Saline and Alkali Soils. Survey of literature and technical problems in the development, evaluation, classification, reclamation and management of saline and alkali soils. (2W)

Smith

***221. Genesis, Morphology and Mineralogy of Soils.** A critical review of soil mineralogy, soil forming factors and soil chemistry in relation to genetic and morphological patterns of soils. Prerequisite: Agron 114 or equivalent. (3F)

Southard

***224. Soil Chemistry.** An advanced course in soil chemistry involving the theoretical aspects of the chemical nature of the soil system. The objective of this course is to develop an understanding of the fundamental principles that govern the chemical status of soils. Special topics will be selected and developed in a rigorous fashion. (3Sp)

Jurinak

230. Research and Thesis. Outlining and conducting research in soils or meteorology and preparation of thesis. Credit arranged. (F, W, Sp, Su)

Staff

Meteorology Courses

GRADUATE AND UNDERGRADUATE COURSES

111. Meteorology Seminar. Review and discussion of current meteorology problems and literature. Required of all seniors majoring in meteorology. (1W)

Staff

117. Weather and Climate. A course primarily designed to give teachers a basic knowledge of weather phenomena including their causes and effects, and to explain topographic and seasonal changes in weather and climate. Aids in teaching weather and climate will also be an important part of the course. Credit will not be given for both Met 17 and Met 117. (4Su)

Richardson

***120. Physiographic Climatology of the United States.** The general cause and effect relationships between physiographic features and climates. These principles are then applied to a discussion of climates within the United States, broken down on a regional basis. Prerequisites: Physics or instructor's consent. (3Sp)

Reynolds

125. Bioclimatology. Interrelations between living organisms, both plants and animals in-

cluding man, and the physical and chemical factors of their atmospheric environment. (3W)

Richardson

126. Environmental Climatology. Readings in climatic changes resulting from environmental modifications due to engineering construction, architectural design, agricultural practices and other activities of mankind. Credit arranged. (F, W, Sp, Su)

Staff

129. Physical Oceanography. Readings selected to give the student a fundamental understanding of the physical characteristics of the oceans, particularly from the viewpoint of interrelationships between the oceans and the atmosphere. The readings will cover such things as: physical properties of sea water; observations in physical oceanography; the heat budget of the oceans; the general distribution of salinity, temperature, and density; ocean currents; wind currents and wind waves; water masses; interaction between the atmosphere and the oceans. Prerequisite: Phys 22 or instructor's consent. Credit arranged. (F, W, Sp, Su)

Reynolds

***130. Observations and Instruments.** Meteorological observations, techniques and equipment. Covers standard meteorological observational techniques, those used for upper atmospheric observations, and those used for special purposes such as micro or biological work. Prerequisite: Met 17. (2W)

Ashcroft

***131. General Physical Meteorology.** Condensation processes in the atmosphere; visibility in meteorology; solar and terrestrial radiation; meteorological acoustics; meteorological optics; atmospheric electricity. Prerequisites: Met 17, Phys 22 or instructor's consent. (3F)

Reynolds

***132. General Dynamic Meteorology.** A brief review of fundamental and physical concepts; definitions of selected hydrodynamic and thermodynamic terms; the thermodynamics and status of the atmosphere; the effects of water vapor on the thermodynamic characteristics of the atmosphere; horizontal motions in the atmosphere; and characteristics of fluid flow. Prerequisites: Met 17, Phys 22 or instructor's consent. (3Sp)

Reynolds

***133. General Synoptic Meteorology.** General circulation patterns, vertical structure, development, and life cycle of cyclones and anticyclones. Air masses and fronts and their structure. Interpretation and analysis of meteorological charts and diagrams including thermodynamic charts, cross sections, and surface and upper air maps. Three lectures, two lab recitations. Prerequisites: Met 17, Physics 22, or instructor's consent. (5W)

Richardson

*Taught 1968-69

**Taught 1969-70

****134. Atmospheric Phenomena.** Treatment of fog, clouds, thunderstorms, tornadoes, lightning, atmospheric electricity, auroras, atmospheric acoustics, atmospheric optics, and hurricanes. Prerequisites: Met 17, Physics 22, or instructor's consent. (2F) **Reynolds**

141. Tropical Climatology. Selected readings on expected climatic conditions and the wide variations in these conditions. Relationships between these climates and meteorological patterns, topographical conditions, coastal and continental locations, industry, transportation, vegetation, agriculture, health and wealth. Credit arranged. (F, W, Sp, Su) **Reynolds**

145. Paleoclimatology. Readings in Paleoclimatology. A review of factors influencing climatic change and evidences of climatic variations drawn from many disciplines. Credit arranged. (F, W, Sp, Su) **Richardson**

150. Special Problems. Conferences or laboratory investigations. Subject and credit arranged. (F, W, Sp, Su) **Staff**

170. Air Pollution Climatology. Readings selected to give a broad background of the air pollution problems in the United States and the place of meteorologists in their solutions. Assignments will include topics such as: the extent of air pollution in the United States; meteorological conditions favorable to the concentration of contaminants; macro, meso and microscale influences contributing to the development of air pollution; regional discussions of the distribution of air pollution-favorable climates; and meteorological measurement support systems. Prerequisites: Met 17, College physics and calculus. Credit arranged. (F, W, Sp, Su) **Reynolds**

***171. Cloud and Precipitation Physics.** Brief review of thermodynamics of moist air; thermodynamic equilibrium and change; nucleation processes; nuclei in the atmosphere; the initial growth of droplets and ice crystals in clouds; cloud droplet spectra and growth by coalescence; cloud dynamics; weather modification. (3W) **Reynolds**

180. Methods in Applied Climatology. Readings and problems in the procedures and techniques of selecting, organizing, summarizing,

interpreting, and reporting climatic information for specific practical purposes. The concentration will be on the entire problem, beginning with its specific definition and ending with the report to the assumed client. A wide spectrum of climatic parameters, including synoptic conditions, will be considered separately and in combination. Prerequisites: Met 120. Credit arranged. (F, W, Sp, Su) **Staff**

GRADUATE COURSES

212. Seminar. Review of current literature in meteorology. Required of all graduate majors. (1F, W, Sp) **Staff**

218. Special Problems. Students select a problem, review the literature, conduct experiments and write a report. Credit arranged. (F, W, Sp, Su) **Staff**

225. Applied Climatology. Readings selected to develop the student's knowledge and appreciation of the effects of meteorological conditions and events on industry, agriculture, health, marketing, population distribution, biological processes, and/or other activities according to the student's backgrounds and interests. The potential and limitations of climatological information in decision processes. Prerequisite: Permission of the instructor. Credit arranged. (F, W, Sp, Su) **Staff**

230. Research and Thesis. Outlining and conducting research in soils and preparation of thesis. Credit arranged. (F, W, Sp, Su) **Staff**

****241. Physical Climatology.** Special emphasis will be placed on the global energy and water balance regimes of the earth and its atmosphere. These topics entail a discussion of radiation, heat transfer in soil, water and air, and evapotranspiration. Prerequisites: Met 131, 132. (3W) **Ashcroft**

242. Mountain Climatology. Readings in free air climatology as determined from upper air soundings. Modifications of the free air imposed by interaction of principles studied in Physical Climatology and variations in slope, aspect, altitude and other topographic influences. Credit arranged. (F, W, Sp, Su) **Staff**

*Taught 1968-69

**Taught 1969-70

Department of

Veterinary Science

HEAD: MERTHYR L. MINER, Professor; DVM, Iowa State University, post-doctoral work, University of Minnesota

OFFICE: Veterinary Science Building

JAMES L. SHUPE, Professor; DVM, Cornell University

JOSEPH T. BLAKE, Associate Professor; PhD, DVM, Iowa State University

JAY W. CALL, Associate Professor; DVM, Colorado State University

ROSS A. SMART, Associate Professor; DVM, Colorado State University

DON W. THOMAS, Associate Professor and Extension Specialist; DVM, Iowa State University

JAMES ALAN THOMAS, Assistant Professor; DVM, Colorado State University

Collaborators: WAYNE BINNS, DVM, MS; KENT VANRAMPEN, DVM, PhD

Since no advanced degrees are offered in this department, courses listed are to strengthen the graduate curriculum in nutrition, breeding, biochemistry, parasitology, bacteriology, and toxicology. The comparison of the normal structure and physiology to the biological response of animals to disease agents, infectious and noninfectious, is of importance in these related fields.

Veterinary Science Courses

GRADUATE AND UNDERGRADUATE COURSES

***140. Veterinary Parasitology.** Detailed study of the scientific name, common name, class, range, pathogenesis, life cycle, methods of control, and treatment of common internal and external parasites of domestic animals. Four lectures, one lab. (5F) **Miner**

150. Artificial Insemination of Animals. A study of the basic concepts of the science of reproduction as related to artificial insemination, training in the art and the management of artificial insemination organizations. The course is for majors in the animal science field who have had courses in anatomy and physiology, bacteriology, nutrition, and breeding. One lecture, two labs. (3Sp) **Call**

GRADUATE COURSES

200. Special Problems. Open to upper division or graduate students majoring in subjects related to veterinary medicine and who wish to study a particular phase of disease in animals. (1-3F, W, Sp) **Staff**

210. Research. Outlining and conducting research on animal diseases. Any quarter. Credit arranged. **Staff**

****230. General Pathology.** An introduction to the cause and mechanism of disease processes: degenerative changes, circulatory disturbances, inflammation, regeneration, neoplasms, and nutritional alterations. Prerequisites: Zoology 118 and 128. Three lectures, two labs. (5W) **Shupe**

****231. Systematic Pathology.** A study of the diseases of the cardiovascular, hemopoietic, respiratory, digestive, urinary, genital, endocrine, nervous, locomotor and tegumentary systems. Prerequisite: VS 230. Three lectures, two labs. (5Sp) **Shupe**

400. Continuing Graduate Advisement. Graduate students who have received maximum thesis credit, but who have not completed the thesis or dissertation, must enroll for a minimum of three credits, until the degree is completed. If the student does not comply, his candidacy may be suspended and his supervisory committee dissolved. (3F, 3W, 3Sp, 3Su.) **Staff**

*Taught 1968-69

**Taught 1969-70

College of**Business and Social Sciences**

DEAN: ROBERT P. COLLIER, PhD, Stanford University

OFFICE: Main 131

Department of**Accounting**

HEAD: NORMAN S. CANNON, Professor; PhD, Columbia University; CPA, State of Utah

OFFICE: Main 131

DUANE A. BARKER, Assistant Professor; MBA, Utah State University; CPA, State of Utah

FRANK A. CONDIE, Assistant Professor; MS, Utah State University; CPA, State of Alaska

JOSEPH S. MERRILL, Assistant Professor; PhD, University of Wisconsin; CPA, State of Alaska

RONALD L. PIERCE, Assistant Professor; MAcc, Brigham Young University; CPA, State of Utah

WILLIAM V. TEZAK, Assistant Professor; MBA, University of Denver; doctoral work, Indiana University

The Department of Accounting offers the Master of Science degree in Accounting. This program is closely associated with the MBA degree offered in Business Administration (see below) but differs in that it permits a higher degree of specialization in accounting.

At least 30 percent of the course work for the degree will be in MBA oriented courses. A student with a strong undergraduate emphasis in accounting will have time for more. It is believed that accountants will function best in their capacity as management, tax and systems consultants when they know the problems and motivation of management.

Financial assistance is available in the form of graduate assistantships for outstanding candidates. Graduate assistants lead introduc-

tory sections of accounting or otherwise assist individual faculty members. USU also offers a limited number of research fellowships which are open to all majors including accounting students.

The graduate program in accounting is open to all students with a degree from an accredited college or university upon approval of the admissions committee. The typical program is designed for the student with an undergraduate degree in accounting and should take three quarters to complete. Students without an accounting degree will formulate their program with the aid of their committee. Time required will vary according to the amount of accounting, economics and related business courses in their undergraduate programs. A student with no previous accounting work

should plan for at least eight quarters.

The following requirements for the MS degree in Accounting must be met:

1. An acceptable undergraduate degree in Accounting (or a committee approved supplement referred to above).

2. Three courses selected from the following:

BA 134 Production
BA 149 Business Policy
BA 218 Computer Management
BA 230 Research Methods
BA 235 Quantitative Methods
BA 240 Free Enterprise and Public Policy
BA 249 Adv. Bus. Policy
BA 251 Adv. Mkt. Problems
BA 271 Human Aspects of Admin.
BA 281 Adv. Finance Prob.
BA 291 Seminar in Management
BA 292 Seminar in Lab. Relations
BA 293 Seminar in Soc. Respon.
BA 294 Seminar in Organizational Behavior

3. BA 250

4. All of the following accounting courses:

Acctg. 104 Advertising Acctg.
Acctg. 128 Adv. Income Tax
Acctg. 140 Theory
Acctg. 207 CPA Review
Acctg. 208 CPA Review
Acctg. 212 Cases in Cost Acctg.
Acctg. 221 Adv. Auditing
Acctg. 241 Controllershship
Acctg. 297 Seminar
Acctg. 298 Seminar

It should be noted that a minimum of 45 credits as a graduate student is necessary to meet the university requirements.

Thesis. The usual University Thesis requirement is met through two Plan B projects to be written in connection with Accounting 297, 298. If a student so desires he may substitute a thesis and up to 10 hours of credit in Accounting 290 for the Plan B projects and Accounting 297, 298.

Examinations. Prior to admission the candidate should take the Admission Test for Graduate Study in Business and submit the results with the application for admission. In addition, two major examinations are given:

1. A comprehensive written examination, during the last quarter of his classwork, to test his achievement and knowledge in the general area of business and accounting.

2. An oral examination on the argumentation and content of the thesis or Plan B projects.

Accounting Courses

GRADUATE AND UNDERGRADUATE COURSES

100. *Survey of Accounting Principles.* For Engineering, Agriculture, Family Life, Forestry, Education, and other nonbusiness students. (4F, W, Sp, Su) **Tezak**

101, 102. *Intermediate Accounting Principles.* Modern analytical and interpretive aspects of accounting. Prerequisites: Accounting 1, 2, and 3. 101 (4F, 4W) 102 (4W, 4Sp) **Pierce, Barker**

103, 104. *Advanced Accounting.* The study of special accounting problems. 103 (4F, 4Sp) 104 (4F, 4W) **Cannon, Merrill**

111. *Industrial Cost Accounting.* Job costing, process accounting, and special considerations. (5W) **Cannon**

112. *Advanced Cost Accounting.* Standard costing, direct costing and advanced theory in cost accounting. (3Sp) **N. Cannon**

119. *Accounting Systems and Automation.* The application of new methods of processing data to the various types of accounting records and accounting systems. (3F) **Staff**

121. *Auditing Theory and Practice.* Principles and procedures associated with accounting verification and audit practice. Prerequisite: a year of intermediate accounting. (4W, Sp) **Merrill**

127, 128. *Income Tax Accounting.* A study of problems resulting from the imposition of taxes on income by the Federal Government, with emphasis on the accounting phases of these problems. 127 (4F, Sp), 128 (4W) **N. Cannon**

129. Government Accounting. Basic principles underlying treatment of public and governmental accounts. Typical topics for study are: statutory funds, budgets, trust funds, and preparation of financial reports. (3W)

Barker

140. Accounting Theory. History and development of accounting and financial statements, their meaning and interpretation with special emphasis on current problems in accounting theory. (4W)

Merrill

199. Internship in Accounting. Practical experience with public accounting firms and approved business in the Intermountain and Pacific Coast Region for selected seniors. Credit arranged, not to exceed 7 hours. (F, W, Sp, Su)

N. Cannon

GRADUATE COURSES

201, 202. Advanced Accounting Principles. The study of special accounting problems. (3F, 3Sp)

N. Cannon

206. CPA Law Review. Review of the elements of business law. (3W)

Daines

207, 208. CPA Review. A course aimed at guiding the student to the successful completion of the Certified Public Accountant examination. The staff will maintain advisory contact with student until this goal is reached. (3W, 3Sp)

Cannon

209, 210. Accounting for Management Control. An introduction to accounting at the graduate level. Emphasis is on the use of accounting information in making business decisions. (3F, W)

Merrill

212. Cases in Cost Accounting. Cost Accounting application to management decision making. Prerequisite: Accounting 111. (3F)

N. Cannon

221. Seminar in Auditing. Readings and Cases in Auditing. Some practice in CPA review. (3Sp)

Merrill

241. Seminar in Controllershship. Investigation of the function of the controller in a modern business organization. Prerequisites: Intermediate Accounting and graduate status—or permission of the instructor. (3F)

Merrill

290. Thesis. For students preparing a Master's degree thesis. Credit arranged. (F, W, Sp, Su)

Staff

295. Independent Research and Reading. Credit arranged. (F, W, Sp, Su)

Staff

297. Accounting Seminar. Seminar in accounting theory. Will require completion of one Plan B project. BA 230 is recommended as a foundation but not required. (3W)

Merrill

298. Accounting Seminar. Seminar in Accounting problems. Emphasis on special problems such as price-level accounting, leases, pension plans, statistical sampling, etc. A Plan B project required. (3Sp)

Cannon

400. Continuing Graduate Advisement. Graduate students who have received maximum thesis credit, but who have not completed the thesis or dissertation, must enroll for a minimum of three credits, until the degree is completed. If the student does not comply, his candidacy may be suspended and his supervisory committee dissolved. (3F, 3W, 3Sp, 3 Su)

Staff

Department of

Business Administration

ACTING HEAD: HOWARD M. CARLISLE, Associate Professor; MS, University of Wisconsin; doctoral work, University of California

DIRECTOR OF MBA PROGRAM: JOHN R. CRAGUN, Assistant Professor; PhD, Purdue University

OFFICE: Main 131

ROBERT P. COLLIER, Professor and Dean, College of Business and Social Sciences; PhD, Stanford University

VERNON M. BUEHLER, Professor; PhD, George Washington University

L. MARK NEUBERGER, Dean of Admissions and Records; Secretary to the Board of Trustees; Professor of Business Administration; EdD, Brigham Young University

REED R. DURTSCHI, Associate Professor and Head, Department of Economics; PhD, University of Washington

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EUGENE C. KARTCHNER, Associate Professor; DBA, University of Washington
GLENN F. MARSTON, Associate Professor; MS, University of Utah; doctoral work, University of Washington

DAVID R. DAINES, Assistant Professor; J.D., University of Utah

MYRON L. DICKEY, Assistant Professor; University of Utah

MARK J. NELSON, Assistant Professor; doctoral work, University of Oregon

ALLEN KARTCHNER, Assistant Professor; PhD, University of Idaho

ELROY McDERMOTT, Assistant Professor; PhD, Montana State University

KRISHNA Y. SHETTY, Assistant Professor; MA, University of California at Los Angeles

TED D. STODDARD, Assistant Professor; EdD, Arizona State University

LAWRENCE C. TAYLOR, Assistant Professor and On-campus Coordinator of AID Business Program in Brazil; MS, Utah State University; doctoral work, Vanderbilt University

SERGE N. BENSON, Lecturer; LLB, George Washington University

Master of Business Administration. The Department of Business Administration offers a Master of Business Administration degree. This degree is designed to give the student special training of a general management nature aimed at providing a background for advancement into supervisory or staff positions in business organizations. The MBA degree does not emphasize narrow specialization in one of the functional fields of business; rather it is a general management degree aimed at developing potential business leadership. Training in the behavioral aspects of administration and in the newer quantitative tools is emphasized. The program provides small classes, intimate contact with professors, significant individual flexibility, and an emphasis on individual development through utilization of the case study technique.

The MBA degree is open to qualified graduate students regardless of their undergraduate major. Two-year and one-year programs are offered. The two-year program is established for undergraduate majors in engineering, psychology, sociology, forestry, liberal arts, and other disciplines outside of business, and consists of approximately

90 credits. To the extent that a student has had appropriate business experience or has taken appropriate course work, a full two years may not be required.

The one-year program is established for students who majored in business at the undergraduate level, and consists of approximately 45 credits. The one-year program is the same as the second year of the two-year program.

The first year (the Basic Program) of the two-year program is to provide the student skills and knowledge in the areas of statistics, mathematics, economics, accounting, production, finance, marketing, and human relations necessary to successfully handle the Advanced Program or second year curriculum. Students previously trained in any of these areas will be exempted from taking course work in the Basic Program which duplicated prior academic training with the approval of the Director of the MBA Program.

The two programs offered consist of the following curriculum:

Prerequisites to program—Math 35 and 66 or equivalent.

BASIC PROGRAM (First year of two-year program for nonbusiness undergraduate majors)

Course	Title	Credit
BA 131	Statistics	3
BA 132	Statistics	3
Acctg. 209	Accounting for Management Control	3
Acctg. 210	Accounting for Management Control	3
BA 204	Survey of Business Law	3
BA 133	Management Concepts	3
BA 134	Production Management	5
BA 151	Marketing Principles	5
BA 171	Personnel Administration	5
BA 180	Financial Institutions	3
BA 149	Business Policy	5
Econ. 100	Survey of Economics	3
Econ. 101	Survey of Economics	3
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ADVANCED PROGRAM (One-year program for business majors. Second year of two-year program)

Course	Title	Credit
BA 212	Administrative Control	3
BA 218	Computer and Systems Management	3
BA 235	Quantitative Methods in Business	3
BA 251	Advanced Marketing Problems	3
BA 240	Free Enterprise and Public Policy	3
BA 250	Managerial Economics	3
BA 271	Human Aspects of Administration	3
BA 281	Advanced Finance Problems	3
BA 249	Advanced Business Policy	3
BA 291	Seminar in Management Theory	3
BA 292	Seminar in Labor Relations	3
BA 293	Seminar in Social Responsibility	3
BA 294	Seminar in Organization Behavior	3

Option:

Thesis or Plan B, BA 290, or Business Report Sequence:	9
BA 230 - Business Research Methods	3
BA 231 - Business Problems I	3
BA 232 - Business Problems II	3

Total Advanced Program 45

reports under the direction of a supervisory committee, or (2) he may take a three-course sequence which results in the completion of two Business Reports. The course sequence is as follows:

	Credits
BA 230 - Business Research Methods	3
BA 231 - Business Problems I	3
BA 232 - Business Problems II	3

If the student selects the Business Report option, his work is directed by the class instructors and not his supervisory committee. Students taking the thesis or Plan B option may take BA 230, but they are not permitted to register for BA 231 or BA 232. Nine credit hours are given for successful completion of the thesis or Plan B option.

Up to nine hours of electives are permitted in the program with the approval of the student's advisor and the Director of the MBA Program. Electives are approved only in certain instances where a student has a unique need for specialization and where an acceptable program can be arranged.

Admission. The Admission Committee for the MBA Program considers the following four factors in reviewing applications: (1) Undergraduate grade-point average. A 3.0 grade-point is desired, although students with grade-points less than this are considered if other aspects of their application are highly favorable. (2) Their score on the Admission Test for Graduate Study in Business. This test is given four times annually on a national basis by the Educational Testing Service. For information and test schedules, write the Admission Test for Graduate Study

¹Student is to take three of the four seminars offered. The fourth seminar may be substituted for one of the other courses.

As noted above, two options are offered in the MBA program. (1) A student may either complete a thesis (Plan A) or two Plan B

in Business, Educational Testing Service, Box 966, Princeton, New Jersey 08540. Applicants must submit scores on this examination. (3) References to be submitted by three former instructors or associates. (4) Personal interviews with faculty members if necessary. Application should be made to the Dean of the School of Graduate Studies.

Advisor and Supervisory Committee. In general the Director of the MBA Program will serve as the student's advisor as far as course work is concerned. Supervisory committees will be appointed depending on the option the student selects as follows:

If the student selects the thesis or Plan B option, a supervisory committee will be appointed at the time the subject(s) is approved. The responsibility of the committee will be to approve the student's application for candidacy, advise on research, and conduct the Final Oral Examination.

If the student selects to take the Business Report classes, a supervisory committee will be appointed when the student enrolls in his second Business Report class. The committee will normally include the two faculty members supervising the student's reports plus his advisor. The responsibility of the committee will be to approve the student's application for candidacy, and conduct the Final Oral Examination.

Examinations. All students will be required to pass the following two examinations:

1. A comprehensive Written Examination after he has successfully completed 27 or more credits from the advanced program. Students must answer questions from five of the seven subareas contained in the examination. Details about the ex-

amination can be obtained from the Director of the MBA Program.

2. A Final Master's Examination (see Part I of catalog) conducted by the student's supervisory committee. The examination typically covers the content of the thesis or business reports (depending on which option is selected) and other subject matter representing the student's qualifications. Remedial work may be required by the committee prior to granting the degree.

Financial Assistance. Graduate Assistantships and Fellowships are available to outstanding students. The University Research Fellowships are granted by the School of Graduate Studies. Application should be made directly to the School of Graduate Studies by February 1. Graduate Assistantships are awarded by the Department of Business Administration and generally range between \$1,000 and \$2,000 for nine months depending on the time the recipient devotes. Graduate Assistants participate in the grading of papers, perform some research studies, and occasionally instruct in the introductory business courses. Application for assistantships must be made by March 15 to the Head of the Department of Business Administration.

GRADUATE AND UNDERGRADUATE COURSES

113. *Business Simulation.* Principles of Model Building and a simulation of actual business problems as practice in decision making. (2Sp) **Staff**

117. *Introduction to Stored Programming.* Basic Computer logic, flow charting, routines, coding, library program, and data processing application to business. (3Sp) **Kartchner**

118. *Procedure Development.* Principles of job planning and procedure development as applied to the electric accounting machine method of keeping records and processing statistical data. (3W) **Kartchner**

119. Accounting Systems and Automation. The application of new methods of processing data to the various types of accounting records and accounting systems. (3F)

Kartchner

131. Business Statistics. Probability, statistical inferences, statistical descriptions, frequency distributions, simple linear regression and correlation, and analysis of variance and covariance. Prerequisites: Math 35, 60, 66. (3F, W, Su)

Kartchner

132. Business Statistics. Time series analysis, multiple regression, sampling, statistical quality control. Prerequisite: BA 131. (3W, Sp, Su)

Kartchner

133. Management Concepts. The investigation and application of fundamental concepts of management and organization theory. Prerequisite: Junior standing or above. Business majors should take this course fall or winter term of the Junior year. (3F, W, Sp, Su)

Taylor, Shetty, Carlisle

134. Production. A study of the production function and its problems, considering interrelationships with other business activities. Focuses on the managerial aspects of: production planning, procurement, inventory control, production control, quality control, layout, methods improvement, performance standards, and basic industrial processes. Prerequisites: BA 131, 133, Math 35, 66. (5W, Sp, Su)

Kartchner

136. Procurement and Production Control. A study of the planning and direct control of materials and production activities. Broad topics covered include: industrial purchasing, the planning and control of inventories, and the planning and control of production. Prerequisites: BA 133, 134, Mfg Engin 56, 148, or equivalent. (5F)

Staff

137. Production Management II. Not offered 1968-69.

138. Quantitative Methods For Production Management. A study of the application of quantitative techniques for analysis to selected production problems. Topics covered include: the use of graphic and schematic models, PERT, statistical process control, sampling inspection, and an introduction to the use of linear programming. Prerequisites: BA 132, Mfg Engin 148, or equivalent. (4Sp)

Kartchner

140. Insurance. Studied from the standpoint of the consumer of insurance services. Topics treated include: types of life, property, and casualty insurance contract; nature and uses of life and property insurance; life insurance as an investment; and the organization, management, and government supervision of insurance companies. (3F, Sp)

Daines

141. Real Estate. Introduction to real estate contracts, forms, principles, and recent federal housing legislation. (3W)

Low

142. Advanced Problems in Real Estate. Advanced course in financial and management problems regarding the use and development of real property. (3Sp)

Low

143. Business Communications. The development of psychologically sound and effective business writing. All outside assignments must be in typewritten form. Prerequisites: Engl. 1, 2, 3. (3F, W, Sp, Su)

Stoddard

149. Business Policy. A coordinating course to develop perspective, judgment, and facility in solving problems in production, distribution, personnel, finance, control, and social aspects of business. Prerequisites: BA 132, 133, 150, 151, 171, 181. (5W, Sp, Su)

Shetty, Carlisle

150. Managerial Accounting. Emphasizes the use of accounting as a tool of control for management. Major aspects include budget and managerial control, break-even analysis, selection if alternatives. Prerequisites: Acc. 1, 2, 3, BA 132, 133. (5F, W, Sp)

Staff

151. Marketing Principles. Describes, analyzes, and evaluates our present marketing system. Provides basic tools and background for understanding marketing principles. (5F, W, Sp, Su)

McDermott

152. Marketing Problems and Cases. Devoted to the analysis of marketing case problems. Prerequisite: Marketing 151 or permission of the instructor. (5W, Sp)

James

153. Marketing Readings and Research. Provides perspective by studying the changing market environment and outlook as conditions of our material welfare. Prerequisites: Marketing 151. (5Sp)

James

154. Purchasing. Not offered 1968-69.

155. Management of International Operations. Emphasis on international financial and marketing problems. Deals with U.S. Business planning to operate abroad. Specifically covers areas of exchange rates, tariffs, European Common Market, marketing products in underdeveloped economies. Prerequisites: BA 133, 151, 181. (5F)

Shetty

156. Principles of Advertising. Intended for those who as business executives may direct advertising programs. Includes study of the structure of advertisements for different products, choice of media, consumer research, and the work of advertising departments and agencies. Prerequisite: BA 151. (5F)

McDermott

160. Sales Management. A broad view of important phases of sales administration, planning, and execution applied to manufacturing and wholesale concerns. Deals specifically with the structure and functioning of sales organization and correlation of its activities with those of production and other departments of the business enterprise. Prerequisite: 151. (3W, Sp) **McDermott**

161. Principles and Problems in Retailing. The marketing process from the viewpoint of the retail distributor: types of retail institutions, accounting and statistics, location, store layout, merchandise classification, service policies, pricing, brand policies, buying, merchandise control, advertising and sales promotion, general organization and administration policies. Prerequisite: BA 161. (5W) **Lowe**

171. Personnel Administration. Critical analysis of problems of human relations that confront the manager of a business enterprise and of policies and methods of dealing effectively with these problems. Lectures, problems, and selected cases. (5F, W, Sp, Su) **Shetty, Marston, Cragun**

174. Employment Practices. Application of personnel management techniques to the industrial problem related to recruitment, selection and placement of employees. (3F) **Marston**

175. Wage and Salary Administration. Analysis of compensation policies and programs, job evaluation programs, job pricing, wage and salary surveys, administration and other related problems. (3W) **Marston**

178. Problem Personnel and Industrial Relations. Application of principles of personnel administration to specific personnel and industrial relations problems commonly found in industry. Case studies and problems are emphasized. (3Sp) **Marston**

180. Financial Institutions. The functions and economic significance of the major financial institutions in the American economy. A review of the role played by these institutions in supplying loanable funds to consumers, business, and governments. Special emphasis on the role of commercial banks as the major supplier of short-term credit in the economy. Prerequisite: Econ 51, 52; Acct. 1, 2, 3; Math 60. (3F, W, Sp) **Nelson, Taylor**

181. Corporation Finance. How the corporation raises and manages its capital. A study of modern financial principles, methods, policies, and institutions. Corporate organization, creation, and reorganization. Prerequisites: BA 180. (5F, W, Sp) **Nelson**

182. Problems in Finance. The application of basic principles of finance to specific cases and problems of a typical nature. Prerequisites: BA 181, Economics 165. (3W) **Nelson**

184. Credit Administration. Not offered 1968-1969.

185. Investments. Common stock and bond valuation theories. Investment portfolio practices. Analysis of security types as investment alternatives for individuals and institutions. Prerequisites: Econ 51, 52; BA 180. (F, W) **Nelson**

186. Security Analysis. Special methods used in analysis of industrial, public utility, railroad and other securities. Taxation of investment income and its relations to investment policy. Development of principles for timing and selection of securities for investment portfolios. Prerequisite: BA 185. (W, Sp) **Nelson**

204. Survey of Business Law. A detailed investigation of the law and business, especially the application of State and Federal laws to free enterprise and business operations. The law involved in business transactions especially as it applies to property used in business. The legal basis for the conduct of modern economic activity. (3F) **Daines**

212. Administrative Control. Management techniques in administrative control through the use of budgetary and accounting data. Emphasizes interpretation of accounting data for managerial purposes. (3F) **Taylor**

218. Computer and Systems Management. A study of the computer as a management control system and its role in modern society. Investigation of systems analysis and design as they relate to management activities. (3F) **Staff**

230. Business Research Methods. Methods and techniques of collecting, analyzing, and interpreting business data. (3F) **Kartchner**

231. Business Problems I. Each student is to undertake independently a business study culminating in one major business report. Seminar analysis of topics, contents and research methods used. Prerequisite: BA 230, Business Research Methods. Open only to nonthesis MBA students. Meets requirements of one Business Report. (3W, Sp, Su) **Staff**

232. Business Problems II. Each student is to undertake independently a business study culminating in one major business report. Seminar analysis of topics, contents, and research methods used. Prerequisites: BA 230 and 231. Open only to nonthesis MBA students. Meets requirements for one Business Report. (3Sp, Su) **Staff**

235. Quantitative Methods in Business. Study and analysis of various statistical models and their application to the decision-making function of the modern business administrator. Deals with quantitative methods for decision making under conditions of certainty, risk, and uncertainty. (3W) **Kartchner**

240. Free Enterprise and Public Policy. The problems involved in doing business with the Government. Public policies with regard to: government procurement, research and development, production, personnel practices, contracting, renegotiation, contract termination, ownership of facilities, marketing and pricing, etc. (3W) **Carlisle**

249. Advanced Business Policy. Analysis of problems from a managerial point of view, considering all functions and policy areas. Integrates subject matter of marketing, production, finance, accounting, personnel and other associated areas in case problems typically faced by management. (3Sp) **Carlisle**

250. Managerial Economics. The integration of economic theory with business practice and policies for the purpose of facilitating decision-making and forward planning. (3F) **Durtschi**

251. Advanced Marketing Problems. An advanced case approach to current marketing management problems. Emphasis on concepts, research, techniques, decision making, and marketing strategy development. (3W) **McDermott**

271. Human Aspects of Administration. An investigation of problems related to the proper use of human resources in business and industry, and their effects on administrative policies and decisions. (3S) **Cragun**

281. Advanced Finance Problems. An analytic treatment in depth in selected areas of fi-

nancial management designed to further the student's understanding of the financial management function and the importance it has to the firm. (3W) **Nelson**

290. Thesis. For students preparing a Master's degree thesis. Credit arranged. (F, W, Sp, Su) **Staff**

291. Seminar in Management Theory. This seminar is directed at reviewing and evaluating the recent theories of management and organization. Traditional theories are analyzed in terms of the impact of the behavioral and mathematical sciences. (3F) **Carlisle**

292. Seminar in Labor Relations. Seminar in the theory of the labor movement and the role of labor in today's industrial society. (3W) **Marston**

293. Seminar in Social Responsibility. An analysis of social responsibility concepts and analytic discussion of the issues in social responsibility confronting businessmen in their relations with employees, their customers, and the public and government. (3Sp) **Daines**

294. Organizational Behavior. A graduate seminar to study the behavioral philosophies and theories basic to an understanding of human behavior in organizations. (3F, Su) **Cragun**

295. Independent Research and Reading. Credit arranged. (F, W, Sp, Su) **Staff**

400. Continuing Graduate Advisement. Graduate students who have received maximum thesis credit, but who have not completed the thesis or dissertation, must enroll for a minimum of three credits, until the degree is completed. If the student does not comply, his candidacy may be suspended and his supervisory committee dissolved. (3F, 3W, 3Sp, 3Su) **Staff**

Department of

Business Education and Office Administration

HEAD: THEODORE W. IVARIE, Assistant Professor; EdD, Arizona State University

OFFICE: Main 347

DIRECTOR OF GRADUATE STUDIES IN BUSINESS EDUCATION: TED

D. STODDARD, Assistant Professor; EdD, Arizona State University

OFFICE: Main 343

- L. MARK NEUBERGER, Professor; Dean of Admissions and Records; Secretary to the Board of Trustees; EdD, Brigham Young University
- DONA FAY FROST, Associate Professor; EdD, University of North Dakota
- DONALD A. NELLERMOE, Associate Professor; EdD, University of North Dakota
- FLORIS S. OLSEN, Associate Professor; MS, Utah State University
- GARTH A. HANSON Assistant Professor; MS, Utah State University; doctoral work, Texas Technological College
- HELEN LUNDSTROM, Assistant Professor and Dean of Women; MBA, University of Denver
- GARY RICHARD SMITH, Assistant Professor; doctoral work, University of Idaho
- JERRY LEE WOOD, Assistant Professor; MS, Oregon State University; doctoral work, University of Colorado

The Master of Science degree is available to business education students who are planning to teach or who are teaching in an area of business. The sequences are available during the regular academic year, and they are also available for summer school students. Attendance at three summer sessions should enable a student with an adequate background to complete either program. Summer workshops attract national leaders in bookkeeping, shorthand, typing, marketing, and related areas.

Well-qualified teachers, modern, up-to-date equipment, and a progressive curriculum make Utah State University an excellent choice for students and teachers who wish to continue their training in Business Education or Marketing Education.

1. The following courses are to be taken by all Business and Marketing Education master's degree majors:

B.E. 250, Issues and Trends in Business Education	3
B.E. 260, The Business Curriculum	3
B.E. 280, Seminar in Business Education	2
B.E. 290, Research in Business Education	Cr. arr.

Business Education majors should select a minimum of two courses from the following:

B.E. 210, Improvement of Instruction in Typewriting	3
B.E. 220, Improvement of Instruction in Shorthand and Transcription 3	

B.E. 230, Improvement of Instruction in Bookkeeping and Accounting ..	3
B.E. 240, Improvement of Instruction in Basic Business	3
B.E. 255, Office Technology	3

The following course should be completed by Marketing Education majors:

B.E. 240, Improvement of Instruction in Basic Business	3
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2. Business Education majors must complete the following:

a. A minimum of 25 credits in Business Education. A maximum of 6 workshop hours may be included in the 25 hours required.

b. A minimum of 9 credits in courses in the fields of Business Administration, Accounting, and/or Economics. (These courses may be on the 100 or 200 level.)

c. A minimum of 12 credits in the general field of education and psychology. (These courses may be on the 100 or 200 level.)

3. Marketing Education majors must complete the following:

a. A minimum of 15-18 hours in Business Education. A maximum of 6 workshop hours may be included in these hours.

b. A minimum of 15-18 hours in Business Administration. (These courses may be on the 100 or 200 level.)

c. A minimum of 12 credits in the general field of education and psychology. (These courses may be on the 100 or 200 level.)

4. Students in Business or Marketing Education will be permitted to follow either Plan A or Plan B as described on pages 10-11.

5. Students will be expected to present the equivalent of an undergraduate major in business or do sufficient background work in business to provide for the equivalent of an undergraduate major.

6. The maximum credit allowed on thesis in Business or Marketing Education will be 9 credits and a maximum of 3 credits on projects under Plan B.

Business Education Courses

GRADUATE AND UNDERGRADUATE COURSES

150. Philosophy of Distributive Education. Philosophy of vocational business education with special emphasis on the importance of distributive education in a free enterprise system. (3F) **Smith**

155. Methods of Teaching DE and Cooperative BE. Instructional methods and coordination techniques involved in teaching cooperative business and distributive education. Includes instructional materials, individual instruction kits, finding and maintaining training stations, selection of students, desirability of advisory committees and student club activities. Prerequisite: BE 150 or instructor's permission. (3W) **Smith**

178. Methods of Teaching Business — non-skilled. A study of the methods of teaching as applied to basic courses: General Business, Business Law, Business Principles, Business Arithmetic, Economic Geography, etc. Also a study of methods applicable to record-keeping and bookkeeping. This course is designed for the inexperienced business teacher education student. (3F, Sp) **Motley, Wood**

179. Methods of Teaching Typewriting and Office Practice. Instructional methods and new developments in teaching of typewriting. Methods for building accuracy, speed, and increasing production; work standards; classroom equipment and materials. Also, includes instructional methods and materials in teaching of office practice and business machines, class organization plans, equipment needs, cooperative training, standards and evaluation. For the inexperienced business teacher education student. (3W, S) **Frost, Stoddard**

180. Methods of Teaching Shorthand and Transcription. Instructional methods and materials in the teaching of shorthand, transcription, business English, filing and secretarial procedure. Includes factors affecting speed building and standards and grading in shorthand, and transcription. For the inexperienced business teacher education student. (3F, W) **Frost, Olsen**

185. Managing Personal Finances. Designed to aid in meeting the growing complexity of personal finances; how to avoid financial entanglements, how to handle installment buying, borrowing money, owning or renting a home, investing and speculation in securities, everyday legal problems dealing with illness, death, personal taxes. (5W, Su) **Wood**

189. Principles of Business Education. The study of current problems in Business Education and a survey of the recent literature in the field. (3F) **Ivarie**

GRADUATE COURSES

210. Improvement of Instruction in Typewriting. A study of the basic factors of typewriting skill and improvement of methods and techniques in typewriting for the experienced business teacher. (3Su and as needed) **Nellermoe, Stoddard**

220. Improvement of Instruction in Shorthand and Transcription. Designed for in-service teachers of shorthand and transcription. A study of improved methods and techniques applicable to the teaching of shorthand and related courses in the high school and junior college level. (3Su and as needed) **Stoddard, Frost**

230. Improvement of Instruction in Bookkeeping and Accounting. Designed for the in-service teacher of bookkeeping and accounting. A study of improved methods and techniques for in-service business teachers at the secondary and at college level. (3Su and as needed) **Motley**

240. Improvement of Instruction in Basic Business. An analysis of methods and techniques employed in the teaching of basic business courses. Also, study of the function and purpose of the basic business courses. (3Su and as needed) **Motley, Ivarie**

245. Cooperative Programs in Business Education. Workshop and research activities for the high school teacher supervising a work-experience program. (3Su) **Smith**

250. Issues and Trends in Business Education. An analysis of the pertinent issues and trends in education that pertain to a business as well as to those issues and trends that are inherent in business education itself. (3Su and as needed) **Stoddard, Motley**

255. Office Technology. Adjustment to technological changes that are occurring in office occupations. A look at data systems, peripheral office equipment, and methods pertinent to curriculum improvement. (3Su and as needed) **Motley, Ivarie**

260. The Business Curriculum. An analysis of the principles, concepts, methods, and procedures of studying, changing and construction of business offerings, in the secondary schools and colleges so as to better meet the needs of students. (3Su and as needed) **Nellermoe, Stoddard**

262. Evaluation of Business Education. Detailed analyses of survey and measuring devices in business education subjects. (3Su and as needed) **Stoddard**

70 College of Business

264. Implementation of Business Education. Departmental and classroom problems related to the organization and implementation of business education curriculums, equipment guidance, in-service training, and personnel. The regulation of vocational business education programs by state and federal agencies. (3Su and as needed) **Ivarie**

266. Philosophy of Vocational Business Education. Development of a modern philosophy of vocational business education. (3Su and as needed) **Motley**

267. Supervised Work Experience. Active participation in approved business offices for the purpose of gaining work experience directly related to office education. Selection of training stations must be approved by college supervisor at least one quarter ahead of registration. Credit arranged. (Su and as needed) **Stoddard**

268. Vocational Team Teaching. Student teaching at the graduate level in approved high school cooperative work-experience programs or simulated block programs. A team-teaching philosophy will be employed as the cooperating teacher and student teacher attempt to provide for students' individual differences. Credit arranged. (Su and as needed) **Stoddard**

270. Workshop in Business Education. Special workshops on selected issues, trends, and principles in Business Education. (1-6Su) **Staff**

271. Workshop in Business Education. Intensive one- to five-day workshop on pressing issues and trends in business education. (1Su) **Staff**

272. Workshop in Business Education. Intensive one- or two-week workshop on principles, issues and trends in business education. (2Su) **Staff**

273. Workshop in Business Education. A two-week workshop on current trends and issues applying to specialized or general fields in business education. (3Su) **Staff**

280. Seminar in Business Education. An analysis of research methods applicable to business education. (2Su and as needed) **Ivarie, Stoddard**

290. Research in Business Education. Selection and researching the problem or problems required under Plan A or Plan B of the graduate study requirement. Credit arranged. (F, W, Sp, Su) **Staff**

295. Independent Research and Reading. Credit arranged. (F, W, Sp, Su) **Staff**

400. Continuing Graduate Advisement. Graduate students who have received maximum thesis credit, but who have not completed the thesis or dissertation, must enroll for a minimum of three credits, until the degree is completed. If the student does not comply, his candidacy may be suspended and his supervisory committee dissolved. (3F, 3W, 3Sp, 3Su.) **Staff**

Office Administration Courses

GRADUATE AND UNDERGRADUATE COURSES

167. Office Practice. Training in use of dictating and transcribing machines, photocopy equipment, varityper, and spirit, stencil and offset duplicators. Prerequisite: OA 42. (2F, W, Sp, Su) **Hanson**

175. Office Management. Emphasis on principles of office management, duties and responsibilities of the office manager, types of organization, methods of control, office arrangement and equipment, job analysis, selection, employment and training of employees. Prerequisite: Economics 51, 52. (3F) **Motley, Frost**

186. Secretarial Procedures. Office routines are studied, with special emphasis on use of reference books, transportation and travel, use of telephone, telegraph, and cablegram services, financial records, writing for publication, minutes and meetings. (3W, 3Sp) **Frost**

Department of

Economics

HEAD: REED R. DURTSCHI, Associate Professor; PhD, University of Washington

OFFICE: Main 322

DIRECTOR OF MASTER'S PROGRAM IN ECONOMICS: BARTELL C. JENSEN, Associate Professor; PhD, Purdue University

OFFICE: Main 328

- LEONARD J. ARRINGTON, Professor; PhD, University of North Carolina
ROBERT P. COLLIER, Dean, College of Business and Social Sciences; Professor; PhD, Stanford University
VERNON L. ISRAELSEN, Emeritus Professor; PhD, University of Wisconsin
EVAN B. MURRAY, Emeritus Professor; MS, Utah State University; doctoral work, University of Chicago
GLENN F. MARSTON, Associate Professor; MS, University of Utah; doctoral work, University of Washington
GARY B. HANSEN, Assistant Professor; MS, Utah State University, doctoral work, Cornell University
KENNETH LYON, Assistant Professor; MS, University of Chicago; doctoral work, University of Chicago
ROGER A. SEDJO, Assistant Professor; MA, University of Illinois; doctoral work, University of Washington.

The Department of Economics offers work leading to the Master of Science, Master of Arts, and Doctor of Philosophy degrees in Economics.

Candidates for the masters degree in Economics must take the following or equivalent undergraduate courses: Economics 106, 107, 108, 140, 165; Statistics 131, 132, or BA 131, 132. Citizens of the United States are also required to take Economics 123, or 125 or 126, and 170. All candidates except those specializing in economic history, labor economics, or teaching at the high school level are also required to take Economics 190, 191, 192.

The usual candidate is expected to complete a thesis as part of the requirements for the Master of Science or Master of Arts degree. In this case a minimum of 45 credit hours is required. This includes 9 to 12 hours of thesis credit, and a minimum of 16 hours of graduate economics courses numbered above 200. The balance of credit hours may be taken from any upper division or graduate courses in economics or related fields with the approval of the chairman of the masters program. Courses which must be included are Economics 203, 207, and 208. Successful completion of a

comprehensive examination and thesis defense is also required. Students with undergraduate degrees in economics or closely related fields should be able to complete thesis requirements in three or four quarters.

For students desiring a nonthesis option, a minimum of 65 credit hours is required. This includes not less than 28 hours of graduate economics courses number above 200. (In certain cases approved 200 level courses in related fields may be used to meet these requirements.) The balance of credit hours may be taken from any upper division or graduate courses in economics or related fields with the approval of the chairman of the masters program. Courses which must be included are Economics 203, 207, and 208. Successful completion of a comprehensive examination with emphasis on required graduate courses is also required. Usually this examination will be scheduled during the fifth quarter of work. Students with undergraduate degrees in economics or closely related fields should be able to complete these requirements in five or six quarters.

The Department also offers the PhD degree. Requirements for the doctorate are shown in the Inter-

departmental Curriculum in Economics.

Graduate research is promoted through departmental relationship with the University Research Council, the Institute of Economic Research, and other private and public agencies.

Students who plan to do graduate work in Economics should have or plan to acquire good training in Mathematics, Statistics, and Languages.

Economics Courses

GRADUATE AND UNDERGRADUATE COURSES

106. **History of Economic Thought.** Study of the origin and development of economic theories of leading thinkers in Western civilization from 1750 to now. (3F) * **LeBarron**
107. **Micro-economic Theory.** Theory analyzing the economic behavior of households and business firms within the framework of private capitalism. (4F, W) **Durtschi**
108. **Income and Employment Theory.** An analysis of the underlying causes of unemployment economic instability, inflation and economic growth. (4W, Sp) **Durtschi**
123. **Introduction to Labor.** Provides a broad view of the economic, social and political sources and manifestations of the labor-management relationship. (3W) **Hansen**
125. **Trade Unionism and Collective Bargaining.** Describes and analyzes the formulation and administering of collective agreements between labor and management. (3W) **Hansen**
126. **Trade-Unionism and the Law.** The legal frame-work of the trade union activity; restrictive, permissive, and promotional legislation; the judiciary and labor. (3W) **Murray**
127. **Social Security.** Survey of the main divisions of social security legislation; workmen's compensation, legal minimum wage, regulation of hours, unemployment compensation, old age insurance, family wage systems and health insurance. (3Sp, Su) **Murray**
135. **Transportation Economics.** The emphasis is upon railroad transportation in the United States. Economic principles that underlie rate structures and work of regulatory agencies. (3W) **Israelson**
140. **International Economic Relations.** Basic economic relationship between industrial nations, trade restrictions, international debt and finance and means of promoting progress based on sound economics. (5Sp) **Sedjo**
147. **Public Utilities.** A study of the characteristics of public utilities, regulatory commissions, rate structures, rate discrimination, finance, and rates of returns. (3Sp) **Israelson**
150. **Communist Economics.** History and economic theories of Marxism, the organization of Communist economies, and the economic policies and problems of Russia, China, and other Communist countries. (3Sp) **Arrington**
155. **Public Finance and Fiscal Policies.** Principles involved in establishing the general property tax, income tax, death taxes, taxes upon business, social insurance taxes; effects of taxes in the American Economy; war and postwar finance. (3W) **Israelson**
156. **Special Problems in State and Local Finance.** A critical examination of the tax structure of Utah and its ability to finance public services. Alternative sources of revenue and the school finance program will receive special consideration. (2W) **Israelson**
165. **Money and Banking.** Development of our present monetary and banking system; a critical analysis of central banking. (5F, W, Sp, Su) **Lyon**
170. **Economic History of the United States.** Development of agriculture, industry, labor, transportation and finance from colonial times to now. (5W) **Arrington**
171. **Economic and Business Fluctuations.** Instability in aggregate economic activity and rate of growth. Business Cycles—their history, nature, and causes. Forecasting and control of instability and cycles. (5F, 5W, 5Sp) **Collier**
174. **Business and Government.** The role of the giant corporation in modern economic life; public regulations of monopoly and competitive practices; international and domestic cartels; alternative policy toward business. (3F, Su) **Arrington**
175. **Economic History of Far West.** Development of agriculture, industry, transportation, and finance of the Far West with special attention to the economic development of Utah. (3 credits) **Arrington**
180. **Economic Development.** Theories and principles of economic development, characteristics and problems of underdeveloped and developing countries, alternative techniques and policies for the promotion of growth and development. (3W) **Whaley**

190. Quantitative Economics I. A study of the principal mathematical formulations used in economic analysis. Designed to acquaint the student with those aspects of economic theory typically formulated in mathematical terms. Prerequisite: Math 35 and Econ 107. (3F)

Jensen

191. Quantitative Economics II. Continuation of Economics 190. Prerequisite: Economics 190. (3W)

Jensen

192. Quantitative Economics III. Continuation of Economics 191. Prerequisite: Economics 191. (3Sp)

Jensen

GRADUATE COURSES

200. Thesis. Investigations by graduate students. Credit granted according to work done. (F, W, Sp)

Staff

201. Readings and Conferences. Credit arranged. (F, W, Sp)

Staff

202. Independent Research. Credit arranged. (F, W, Sp, Su)

Staff

203. Seminar in Economic Research. An intensive study of the methods, tools, and objectives of economic research: statistics, economic analysis and economic history. Permission of instructor required. (3F)

Arrington

204. Modern Economic Thought. An intensive study of the main currents in recent economic thought. Prerequisite: Econ 106. (3F)

LeBarron

207. Price Theory. A critical review of a few major topics in price and distribution theory. Open to graduate students and seniors with adequate preparation. Prerequisite: Econ 107. (2F)

Durtschi

208. Advanced Income Theory. A critical review of the major topics in aggregate economic theory. Prerequisite: Econ 108. (3W)

Durtschi

211. Literature of Economics. An intensive study of the bibliographical materials and literature of economics. Permission of instructor required. (2W)

Arrington

See also History 186, Economic History of Latin America. (3W)

Pratt

225. Labor Economics Seminar. Applications of principles and practices of American trade-unionism brought to light through individual and group research projects; analysis and

evaluation of current issues in labor activities. Prerequisite: Econ 123 or 125. (3Sp)

Hansen

240. Seminar in International Trade. A critical review of the major topics in international trade theory and practice. Prerequisite: Econ 140. (3W)

Sedjo

255. Seminar in Public Finance. A critical review of the current literature in the field of public finance. Prerequisite: Econ 165. (3Sp)

Staff

265. Advanced Money and Banking. A critical review of the current literature in the field of money and banking. Prerequisites: 165 and 107. (3W)

Lyon

270. Economic History Seminar. The methods and literature of economic history. (3Sp)

Arrington

290. Introduction to Econometrics. An introduction to the problems of econometric model construction and estimation. Emphasis is placed on the economic content of the methods. No previous knowledge of mathematics beyond elementary calculus and statistics is required. (3W)

Jensen

291. Theory of Economics. An investigation into errors in variables, autocorrelation, multicollinearity, heteroscedasticity, lagged variables, dummy variables, as encountered in single equation models. (3W)

B. Jensen

292. Advanced Theory of Econometrics. Simultaneous equation estimation including identification and the following estimation procedures: indirect least squares, multipletage likelihood, and k-class estimators. (3Sp)

B. Jensen

307. Price Theory. A graduate level course in allocation and distribution theory. Prerequisite: Econ 207. (3Sp)

Gardner

308. Income Theory. A graduate level course in advanced income, monetary and fiscal analysis. Prerequisite: Econ 208. (3Sp)

Lyon

400. Continuing Graduate Advisement. Graduate students who have received maximum thesis credit, but who have not completed the thesis or dissertation, must enroll for a minimum of three credits, until the degree is completed. If the student does not comply, his candidacy may be suspended and his supervisory committee dissolved (3F, 3W, 3Sp, 3Su)

Staff

Department of

History

(History, Geography)

HEAD: S. GEORGE ELLSWORTH, Professor; PhD, University of California at Berkeley

OFFICE: Main 247

J. DUNCAN BRITE, Emeritus Professor; PhD, University of Chicago; post-doctoral research in German State Archives

DARYL CHASE, Emeritus President and Professor; PhD, University of Chicago

EDWIN L. PETERSON, Professor; PhD, Utah State University

STANFORD O. CAZIER, Associate Professor; PhD, University of Wisconsin

DOUGLAS D. ALDER, Assistant Professor; PhD, University of Oregon; Fulbright Fellowship to Austria

KLAUS J. HANSEN, Assistant Professor; PhD, Wayne State University

GARY L. HUXFORD, Assistant Professor; PhD, University of Washington

C. BLYTHE AHLSTROM, Instructor; MA, Columbia University; doctoral work, Rutgers University

CLIFFORD B. CRAIG, Instructor; MS, Utah State University; MS, Ohio State University.

LUCILE PRATT, Instructor; MA and doctoral work, Columbia University

SERGE N. BENSON, Lecturer; JD, George Washington University

The Department offers work leading to the Master of Science and Master of Arts degrees in History.

The University offers both the Master of Arts and the Master of Science degrees in History. Either degree may be obtained under the following two plans. Plan A is recommended for all students who intend to continue graduate work beyond the master's degree. Students under this plan are urged to meet the language requirements necessary for the MA degree. An acceptable thesis must be submitted for which a maximum of nine credits will be given. The student is required to defend his thesis in an oral examination before his committee. It is recommended that 15 credits or more be taken in courses numbered 200. Plan B is recommended for all students pursuing a career of teaching history in the

secondary schools. Under this plan two seminar reports, approved by his committee, and additional concentration in seminar work substitute for the master's thesis. Five seminars are required, including History 201 or its equivalent. Plan B students must successfully complete a comprehensive written examination in certain fields of specialization agreed upon by the student and his supervisory committee.

The Department cooperates with the Department of English in administering the graduate program leading to the Master's degree in American Studies. See the catalog section on English for a statement of that program.

Applicants should consult a member of the department. Professors specializing in History are: S. George Ellsworth, J. Duncan Brite,

Daryl Chase, Stanford O. Cazier, Douglas D. Alder, Klaus J. Hansen, Gary L. Huxford, C. Blythe Ahlstrom, and Lucile Pratt. Staff members in Geography are Edwin L. Peterson, Clifford B. Craig, and Serge N. Benson.

The Institute of Utah Studies. By virtue of its Library holdings, its faculty, and its research programs, Utah State University is a leading center for the study of all phases of Utah's historic and contemporary development. The Institute of Utah Studies has been established for the purpose of collecting and preserving the written and oral record of Utah's distant and recent past, of training persons in the use of the sources and literature of Utah history, and encouraging and assisting all persons, especially teachers and research writers in the social sciences and humanities, in the detailed study of any and all phases of Utah's development, and of offering courses and seminars in regular history. The Institute appeals especially to teachers of historical and analytical studies of a regional nature. Students with this interest should give special attention to History 135, 137, 226, and 237. Director of the Institute of Utah Studies is S. George Ellsworth.

History of Europe and Asia

GRADUATE AND UNDERGRADUATE COURSES

105. **Greek History.** Greek civilization to the Roman conquest, 146 B.C. Emphasizes political, social, intellectual, and artistic developments and contributions (5F) **Ellsworth**
106. **Roman History.** From the earliest times to the decline of the Roman Empire in the West in the fifth century A.D. (5W) **Ellsworth**
107. **The Rise of Christianity.** The early Christian Church, with emphasis on a study of the teachings of Paul and the impact of Paul's letters. The Church in its Hebrew setting, its growth and development in the Graeco-Roman World. (5F) **Chase**
111. **Medieval Europe.** (500-1500 A.D.) Political, economic, social, and cultural developments during the Middle Ages. (3Sp) **Brite**
114. **History of Science I.** History of Science to Copernicus. (3Su) **Staff**
115. **History of Science II.** History of Science since Galileo. (3Su) **Staff**
121. **Germany Since the Reformation.** Historical development of Germany since the Reformation to the present; backgrounds of "the German problem," Germany under Bismarck, World War I, Germany under Hitler, post-war Germany. (5W) **Alder**
124. **Renaissance and Reformation.** (1250-1600) (5F) **Brite**
125. **Absolute Monarchies.** (1589-1789) (3W) **Brite**
126. **French Revolution and Napoleon.** (1789-1815) (3Sp) **Brite**
127. **Nineteenth Century Europe.** Political and economic developments between 1815 and 1914. (3Sp) **Hansen, Brite**
128. **Twentieth Century World.** Political and economic developments in Europe, America, Asia, and Africa since the end of World War I. (3F, Sp) **Hansen, Brite, Alder**
138. **History of Russia to 1917.** From the earliest times to the Revolution. (3F) **Brite**
139. **History of the Soviet Union.** From the Revolutions of 1917 to the present day. (3W) **Brite**
161. **England to 1603.** From the earliest times to the death of Elizabeth. (3F) **Brite**
162. **England Since 1603.** From King James I to the present day. (3W) **Brite**
163. **The British Empire.** Rise and decline of the British Empire in the modern world. (3Sp) **Staff**
165. **Expansion of Europe.** The conquest and exploitation of the world by Western Europeans between 1400 and the present, emphasizing the methods, the motives and the results of this European domination in various parts of the world; the acculturation and resurgence against foreigners; and the decline of western power. (5Sp) **Pratt**
166. **European Cultural History I.** Modern European intellectual history to the nineteenth century, with emphasis on the relations between patterns of thought and society. (3F) **Hansen**
167. **European Cultural History II.** European intellectual and social history in the nineteenth century, with emphasis on the development of social institutions and ideas. (3W) **Hansen**

168. **European Cultural History III.** European intellectual and social history in the twentieth century. (3Sp) **Hansen**

170. **A Study of War and Peace in History.** A study of the causes of war and the conditions for peace, considered in the historical context of various civilizations at various periods of time, selected with the view to understanding the complexity of the problem and the conditions necessary for a possible solution. See catalog section on The Center for the Study of the Causes of War and Conditions for Peace. (3F, S) **Chase**

175. **East Asia to 1800.** Development of the civilizations of East Asia—China, Japan, and Korea—from their origin to the 19th century. (3W) **Staff**

176. **East Asia Since 1800.** Emphasis on China and Japan in the 19th and 20th centuries. (5Sp) **Staff**

177. **Chinese Civilization.** (3Su) **Staff**

178. **Japanese Civilization.** (3Su) **Staff**

145. **Rise of Modern America.** (1877-1900) Political, economic and cultural developments; reform movements; and foreign affairs from the Reconstruction period to the establishment of the United States as a world power in 1900. (3F) **Ahlstrom**

146. **The Progressive Era.** Emphasis on political, economic, and social reform from the turn of the century to the 1920's (1900-1920's) (3W) **Ahlstrom**

147. **Recent America.** Domestic and foreign affairs of the United States since World War I, emphasizing the development of modern America and her role in the world affairs. (1920-present) (3Sp) **Ahlstrom**

150. **Comparative American Religions** A historical, comparative study of religions and major churches in America. The development of the major faiths and churches in America, their role in American life and the shaping of the American tradition; church and state relations in America. (3S) **Chase**

155. **Cultural History of the United States.** A social and intellectual history of the United States with emphasis on the development of major thought patterns in relation to their social-economic context. (5F) **Cazier**

171. **Constitutional History of the United States.** (5W, Sp) **Huxford**

173. **Immigration to the United States.** Survey of causes of emigration, the voyages, and initial reception as well as eventual acculturation within the United States, emphasizing the immigration from Europe. (3Sp) **Pratt**

181. **Latin America to 1830.** Geography, pre-Columbian peoples, exploration and conquest and colonization by European powers, political and social and economic developments, international rivalries and ineffective mercantilism, prominent revolutionists and the independence wars. (3F) **Pratt**

182. **Latin America since 1830.** The new nations emerging from the independence wars; the social, economic and political development of the twenty Latin American nations in the nineteenth and twentieth century. (3W) **Pratt**

184. **History of Mexico.** The social, economic, and political history from colonial times to the present, with major emphasis on the national era. (3W) **Pratt**

185. **History of United States-Latin American Relations.** The diplomatic, economic and cultural relations between the United States and the twenty Latin American nations. (3F) **Pratt**

History of the United States and Latin America

GRADUATE AND UNDERGRADUATE COURSES

134. **The American Frontier.** From English, French, and Spanish beginnings along the Atlantic to the occupation of the Great Plains. (1492-1848) (3) **Staff**

135. **History of the Far West.** Deals with the region from the Rockies to the Pacific Coast, with emphasis upon the Intermountain West. (5F) **Staff**

137. **History of Utah.** Geography and native peoples, early explorations, political, social, and economic developments to the present. (5F, W, Sp) **Ellsworth**

141. **Colonial America.** The colonial period of American history from the European background to 1775. (3F) **Huxford**

142. **The New Nation.** The course of American history from the beginning of American Revolution to the 1820's. (3W) **Huxford**

143. **The Jacksonian Era.** Political, economic and cultural developments from the 1820's to 1850, emphasizing the development of political parties and the character of Jacksonian democracy. (2Sp) **Ahlstrom**

144. **The Civil War and Reconstruction.** (3W) **Cazier**

186. **Economic History of Latin America.** The economy as it developed in colonial days, the economic problems of the new nations in the 19th century, the push to industrialize as well as maintain raw material production in this 20th century, the need for capital investment and government and international efforts to provide this. (3) **Pratt**

187. **History of Atlantic South America.** Political, economic and social development from pre-Columbian peoples to complex national cultures of Brazil, Paraguay, Uruguay and Argentina. (3) **Pratt**

190. **Sources and Literature of History.** European, Asian, and American studies. For all persons preparing to teach or write history. (3F, W, Su) **Ellsworth, Alder**

See also Economics 170—Economic History of the United States. (5W) **Arrington**

GRADUATE COURSES

201. **Historical Method.** Seminar in the basic techniques of historical research. History 190 recommended but not required as a prerequisite. Open to seniors. Recommended to graduate students in fields making use of the historical method in their research. (3F, W, Sp) **Staff**

203. **Historiography.** The history of historical writing. (3F) **Huxford**

205. **Philosophy of History.** Interpretations, causations, and interrelations in history. (3S) **Cazier**

207. **Seminar in American Colonial History.** Guide to the literature and research materials. (3Sp) **Huxford**

222. **Seminar in European History.** (3F, Sp) **Hansen, Alder**

224. **Seminar in American History.** (3W, Sp) **Cazier, Ahlstrom**

226. **Seminar in Western American History.** (3W) **Ellsworth**

228. **Seminar in Latin American History.** (3W) **Pratt**

237. **Teaching Utah History.** Seminar in the sources and literature of Utah History, exercises in the preparation and presentation of materials. (3Su) **Ellsworth**

239. **Readings and Conference in Special Areas.** Credit arranged. (F, W, Sp) **Staff**

259. **Seminar in the Teaching of History.** Limited to Graduate Assistants. (1F, W, Sp) **Staff**

271. **Colloquium on War and Peace History.** Intensive reading and discussion of the literature relating to man's historical attempts to find a means for insuring the peaceful ordering of human affairs. (3W) **Chase**

298. **Thesis.** Credit arranged. (F, W, Sp) **Staff**

400. **Continuing Graduate Advisement.** Graduate students who have received maximum thesis credit, but who have not completed the thesis or dissertation, must enroll for a minimum of three credits, until the degree is completed. If the student does not comply, his candidacy may be suspended and his supervisory committee dissolved. (3F, 3W, 3Sp, 3Su.) **Staff**

Geography Courses

GRADUATE AND UNDERGRADUATE COURSES

100. **Teaching of Geography.** A course designed to assist the classroom teacher in the presentation of geographic information. Techniques, methods and sources of data will be stressed. (3F, Sp) **Craig**

105, 106, 107. **Geopolitics: Europe, Afro-Asia and the Americas.** A more detailed study of the areas under consideration with special attention directed towards the political and cultural backgrounds of the people. Emphasis will be placed upon the historic development of the regions in light of their position in the modern world picture. (3F, W, Sp) **Peterson**

130. **Geography of Underdeveloped Lands.** A geographic analysis of underdeveloped and emergent countries in terms of internal and external problems and interrelationships. (3) **Benson**

131. **Economic Geography.** The economic interchange and relationships between geographic areas, especially the role of international trade in the world economy. Basic patterns of trade, population distribution, capital equipment and agencies affecting international relations. (3F, W, Sp) **Benson**

135. **Physical Geography of the World.** An approach to geography from the physical viewpoint with an emphasis on those aspects of the physical environment that are most important to man. Areas covered are weather, climate, landforms, seas, water resources, natural vegetation and associated animal life, soils, mineral fuels, and minerals of economic importance. An analysis is made of the advantages and disadvantages presented by these factors to man's use and potential use of them. (5F, W, Sp) **Craig**

138. **Geography of World War II.** An analysis will be made of the world-wide character of World War II. Attention will be directed to the territorial losses of the Japanese, British, and French colonial holdings and to the emergence of the United States, the Soviet Union, and Red China as world powers. Emphasis will be placed on the new position of the United States as a Pacific power and the war time and post-war commitments of the United States in the picture. (2W) **Peterson**

199. **Readings and Conference.** Credit arranged. (F, W, Sp) **Staff**

180. **Urban Geography.** Origin and growth of cities. Structure and function of urban centers, their areal expansion and inter-trade center relations. Theory of the urban setting as related to the real. (3F, W, Sp) **Craig**

Department of

Political Science

HEAD: M. JUDD HARMON, Professor; PhD, University of Wisconsin
OFFICE: Main 248

MILTON C. ABRAMS, Professor and Librarian; PhD, University of Utah
WENDELL B. ANDERSON, Professor; LLB, George Washington University
CLAUDE J. BURTENSHAW, Professor and Dean of Students; PhD, University of Utah
M. R. MERRILL, Emeritus Professor; PhD, Columbia University
JEDON A. EMENHISER, Associate Professor; PhD, University of Minnesota
PHILIP S. SPOERRY, Associate Professor; PhD, Harvard University
WILLIAM L. FURLONG, Assistant Professor; PhD, University of Florida
CALVIN W. HIBNER, Assistant Professor; MS, Utah State University; doctoral work, University of Florida
ROBERT W. MOLLAN, Assistant Professor; PhD, University of Minnesota
H. PRESTON THOMAS, Assistant Professor; LLB, Harvard University

The Department offers work leading to the Master of Science and Master of Arts degrees in Political Science. The Department of Political Science cooperates with the Department of English in administering the graduate program leading to the Master's degree in American Studies. See the catalog section on English for a statement of that program.

Political Science Courses

GRADUATE AND UNDERGRADUATE COURSES

101. **American Foreign Policy.** The place of the United States in the world of nations as affected by our traditions, interests, and interpretations of international affairs. (3F) **Merrill**

102. **International Political Relations.** Psychological, economic, racial and other obstacles to international cooperation, as exemplified in recent events. Attention is given to various proposals that attempt to solve the dilemmas of our time. (3W) **Merrill**

110. **Basic Problems in International Relations.** Examines current international developments with emphasis on their relation in the United States. (3Sp) **Merrill**

111. **International Government.** The purposes, organization and operation of the United Nations and the Atlantic Community are studied. (3Sp) **Anderson**

114. **Intergovernmental Relations.** Studies the relations between and among the various units of government in the United States including national, state, county, city and district. (3Sp) **Anderson**

115. **Problems of Utah Government.** Examines contemporary problems of Utah at the state, county, and city level, as well as federal-state and interstate relations. (3W) **Anderson**

117, 118, 119. **American Political Thought.** A survey of American Political ideas and the men who developed them. The historical approach is used, beginning in colonial times and carrying the development of American political thought through to the present. Emphasis is on ideas that have been significant in shaping the form and actions of American government today. Student may register for one, two, or three quarters. (2F, 2W, 2Sp)

Harmon

123. **Political Surveys.** Introduces the student to the tools of political field research and stresses the analysis of voting behavior by utilizing census data, election returns, and questionnaires. (3W)

Emenhiser

124. **Public Opinion and Policy Formulation.** Discusses the nature of public opinion and propaganda and their role in the political process. Assigns research topics on particular current policy developments and assists the student in attempting to determine the effects of public opinion upon governmental policy decisions. (5Sp)

Emenhiser

125. **Political Parties and Practical Politics.** Organization and practices of political parties. (5W)

Emenhiser

126. **Polimetrics.** Presents basic social statistical tests and other mathematical devices applicable to explaining quantitative political data. (3Sp)

Emenhiser

127. **Constitutional Law.** The first part of a two-part foundation course in American constitutional law. The case method is used extensively. PS 10 is a prerequisite. (3F, 3Sp)

Mollan

128. **International Law.** A basic course in the law of nations. Students should have had at least one course in international relations or foreign policy. (5W)

Anderson

131. **Administrative Law.** Constitutional limitations, legislative supervision, and judicial control of administrative agencies, and the forms of administrative action appropriate for American economic and political institutions. (3Sp)

Hiibner

137. **Constitutional Law.** The second part of a two-part foundation course in American constitutional law. The case method is used extensively. Prerequisite: PS 127. (3W, 3Sp)

Mollan

140. **American Legislative Process.** Includes a study of the organization and procedure of legislative bodies and the influences at work in and the character of the output of national and state legislatures. (5W)

Emenhiser

145, 146, 147. **History of Political Thought.** Course 145 covers political thought from its beginnings in the Greek period to the Reformation. Course 146 carries on the study of Hegel. Course 147 is devoted to the modern period and emphasizes a comparative study of socialist, communist, nazi-fascist, and democratic thought. (3F, 3W, 3Sp)

Harmon

151. **Introduction to Public Administration.** Defines the subject matter of public administration, concentrates upon analyzing the problems of governmental administrative organization and management, and explores the methods of securing responsible performance from the bureaucracy. (3F)

Hiibner

152. **Public Personnel Administration.** Reviews the trends and techniques of recruiting and developing the public service and calls attention to the machinery established for these purposes. Prerequisite: PS 151 (3W)

Hiibner

153. **Public Finance Administration.** Describes national, state, and local governmental budgetary and accountability processes in relation to policy formulation. Prerequisite: PS 151. (3Sp)

Hiibner

154. **Public Administration Internship.** Offers the student the opportunity to observe and, within limits, practice what he has learned from his classroom experience. The student will be placed in a nearby governmental office where he will be expected to spend the equivalent of one day per week performing administrative tasks or conducting an administrative survey. Prerequisites: PS 151, 152, 153. (2F, 2W, 2Sp)

Hiibner

157. **Civil Rights Law.** The law as it relates to civil liberties. State and federal action in this area. The emphasis is on Supreme Court decisions and their implementation. (3Sp)

Mollan

159. **Ethics of Society and Law.** This course deals with the problems of knowing, free will, sources of morality, and the morality of law. (3F)

Burtenshaw

160. **Theory and Practice of Government.** Designed to satisfy the demand for an offering in general government on the upper division level for non-political science majors, particularly those in education, forestry and the exact sciences. The course will deal with the important theories underlying the various governmental forms and with the practical operation of government. (3F, W, Sp)

Staff

167. **The American Legal System.** A study of the organization and operation of the American federal and state legal systems. (3F)

Thomas

80 *College of Business*

- 168. Theory of Jurisprudence.** An examination of the important legal philosophies from Aristotle to the present with particular emphasis on the Anglo-American legal system. (3W) **Thomas**
- 170. Major Governments of Europe.** A comparative study of the governments of Great Britain, France, Germany and the Soviet Union. (3F) **Anderson**
- 171. Major Governments of Asia.** Principal attention will be given to the governments of Japan and China. (3Sp) **Spoerry**
- 172. Major Governments of Latin America.** A comparative study of the governments of Argentina, Brazil, Mexico and other selected Latin American Countries. (3Sp) **Pratt**
- 173. Soviet Government and Politics.** Designed to present the structure and functioning of the Soviet government and Communist Party. Attention is given to the theoretical background of Communist government and party practices in modern times. (3F, Sp) **Spoerry**
- 174. Politics of the Communist Bloc.** Relations between Communist and Soviet bloc governments, including the USSR, Communist China and Eastern Europe. (3Sp) **Spoerry**
- 175. Political Systems in South and Southeast Asia.** Politics and government in India, Indonesia, Burma, Philippines, and other countries in the area. (3W) **Spoerry**
- 176. Politics of Underdeveloped Areas.** Characteristics and problems of the political systems of the non-Western world, including Asia, Africa, and the Middle East. (3W) **Spoerry**
- 177. Today's Critical Latin American Problems.** Topics will vary as crises develop, dealing with background and development of each crisis from national, political, economic, or social views. (2F) **Pratt**
- 180, 181, 182. Current Political Problems.** Any quarter may be taken without the preceding quarter or quarters. Lower division students must receive consent of the instructor. (2F, 2W, 2Sp) **Merrill**
- 190. Problems in American National Government.** The student enrolling in this course should have some basic knowledge of the structure of the American national government. Political Science 190 will consider the government in operation and some of the problems which grow out of that operation. Particular emphasis is on the relations between the three branches of government. (3Su) **Staff**
- 195. Library Resources of Political Science.** Devoted to familiarizing students with the basic library materials available. The various types of resources are carefully studied and used by each student. (1F) **Staff**
- ### GRADUATE COURSES
- 201. Research in Political Science.** Credit arranged. (F, W, Sp) **Staff**
- 203. Readings and Conference.** Credit arranged. (F, W, Sp) **Staff**
- 205. Methods in Political Science.** Methods the political scientist must use that are common to all sciences, the particular problems with which the social scientist is confronted, and their application to special problems of political science. (3) **Staff**
- 211. Thesis.** For graduate students preparing a Master's degree thesis. Credit arranged. (F, W, Sp) **Staff**
- 220. Seminar in Comparative Politics.** A seminar designed to give graduate students and qualified seniors a more detailed and deeper knowledge of comparative systems. (3W) **Spoerry**
- 230. Seminars in Public Law.** A seminar designed to give graduate students and qualified seniors a more detailed and deeper knowledge of public law, especially constitutional law. (3F) **Mollan, Thomas**
- 240. Seminar in American Politics.** A seminar designed to give graduate students and qualified seniors a more detailed and deeper knowledge of American politics. (3W) **Emenhiser, Harmon**
- 250. Seminar in Political Theory.** A seminar designed to give graduate students and qualified seniors a more detailed and deeper knowledge of political theory, both American and European. (3F) **Harmon**
- 260. Seminar in Public Administration.** A seminar designed to give graduate students and qualified seniors a more detailed and deeper knowledge of public administration. (3Sp) **Hiibner**
- 270. Seminar in Foreign Affairs.** A seminar designed to give graduate students and qualified seniors a more detailed and deeper knowledge of foreign affairs, including American foreign policy, international relations, and international organizations. (3Sp) **Anderson, Merrill**
- 400. Continuing Graduate Advisement.** Graduate students who have received maximum thesis credit, but who have not completed the thesis or dissertation, must enroll for a minimum of three credits, until the degree is completed. If the student does not comply, his candidacy may be suspended and his supervisory committee dissolved. (3F, 3W, 3Sp, 3Su) **Staff**

Department of

Sociology, Social Work and Anthropology

HEAD: THEREL R. BLACK, Professor; PhD, University of Wisconsin

OFFICE: Main 220

WADE H. ANDREWS, Professor and Chairman, Institute for Social Science Research; PhD, Michigan State University

STEPHEN L. BROWER, Professor; PhD, Cornell University

JOSEPH A. GEDDES, Professor Emeritus; PhD, Columbia University

R. WELLING ROSKELLEY, Professor; PhD, University of Wisconsin

H. BRUCE BYLUND, Associate Professor; PhD, Pennsylvania State University

WILLIAM A. DEHART, Associate Professor; PhD, University of Wisconsin

GORDON N. KELLER, Associate Professor; PhD, University of Chicago

EVELYN HODGES LEWIS, Associate Professor; ACSW; MSW, University of Chicago

ARMAND L. MAUSS, Associate Professor; MA, University of California at Berkeley

JOHN A. PENNOCK, Associate Professor; MS, Graduate Certificate in Social Work, University of Utah

YUN KIM, Assistant Professor; PhD, Australian National University

NILE D. MESERVY, Assistant Professor; MS, Utah State University and University of Washington

ALICE COLTON SMITH, Assistant Professor; MS, Utah State University

BERKLEY A. SPENCER, Assistant Professor, PhD, Cornell University

KATHRYN A. SIKORSKI, Instructor, MS, University of Arizona

Lecturer: ALISON THORNE, PhD, Iowa State University

The Department offers courses leading to the Master of Science and Doctor of Philosophy degrees in Sociology. Research is promoted through departmental relationship with the Agricultural Experiment Station, with the Division of University Research, with state and federal agencies and with private organizations.

Doctor of Philosophy Degree. This degree is offered in Sociology through collaboration with closely related departments in the Social Sciences, the Department of Applied Statistics and departments having natural resource studies.

The specification of courses for a

particular student varies according to the area of concentration and the nature of the research problem chosen by the candidate. The following areas of concentration are featured: (1) Area-Community Studies, Institutional Development, and Rural Sociology (Domestic and Foreign); (2) Sociology of Social Welfare and Corrections; (3) Sociology of Natural Resources; (4) Social-Psychological Elements in Motivation and Consumer Behavior; (5) Demography.

For the PhD degree, facility in one global foreign language is required. In addition, the candidate must have a reading knowledge of a

second foreign language or obtain training beyond the minimum standard in statistics.

All students must have a minimal facility in statistics. PhD students who are examined in only one foreign language must have additional statistics. PhD candidates who discover an aptitude in social statistics will be encouraged to select this field as their minor.

The Department of Applied Statistics and Computer Science has assigned special staff to instruct sociologists and other social science students.

Assistantships, Fellowships and Financial Assistance Available to Students. Assistantships, fellowships, and other financial assistance to students are provided by funds from University Research, University Teaching, the Agricultural Experiment Station, the National Science Foundation, Department of Health, Education and Welfare in cooperation with the Utah Department of Public Welfare, Center for Water Resources Research, the Bureau of Land Management, Agency for International Development (AID), and Organization of American States (OAS).

Sociology Courses

GRADUATE AND UNDERGRADUATE COURSES

100. **Educational Sociology.** The group and human relation factors within the school system, and between the school system, the home, and the community. (3) **Mauss, Black**
110. **Utah Social Problems Seminar.** Analysis and field study of Utah social problems. Must be taken two quarters. (1F, W, Sp) **DeHart**
140. **Social Psychology.** The cultural and social determinants of personality growth. The application of such knowledge to the understanding of group process, mass behavior and the human relations problems that characterize our society. (3F, W) **DeHart**
141. **Rural Community Organization and Leadership.** Forces and procedures which are effective in organizing or disorganizing communities. Techniques of training leaders to help make the community more effective. (3F, W) **Roskelley, Thorne**
144. **Woman Today.** The new and challenging roles of women in adjusting to a modern society. (3) **Staff**
145. **Alcoholism.** See HPER 145. (3) **Nelson**
153. **History of Social Thought.** Development of social thought from early periods to August Comte. Important developments in Europe and America after Comte especially early American thought. (5F) **Roskelley**
154. **Population Problems.** Population theory, growth and changing pattern of the population. The significance of these population changes on today's living and planning for the future. (3F, W) **Kim**
155. **World Population Problems.** Current and future population problems, particularly in less developed areas of the world. Factors affecting population growth and change. (3W, Sp) **Kim**
156. **Social Institutions.** Similarities and differences in institutions as they emerge, grow and decline. Problems of keeping institutional objectives attuned to the fulfillment of the needs of an evolving social order. (3) **DeHart**
158. **Human Relations in Industry.** Human relations, philosophy and skills applicable to present-day management practices. The contribution of social science in building a human relations program in industry. (3F) **DeHart**
159. **Industrial Sociology.** Stresses contribution of sociology to the understanding of industry as a social system. Includes work behavior of individuals and consideration of the impact of technological change on the community and larger society. (3F, Sp) **DeHart**
161. **Modern Social Problems.** Major American social problems. Adjustments and changes as means of minimizing disorganization. (3W, Sp) **Lewis**
170. **Intermediate Sociology.** Basic principles of sociology are considered in their theoretical and methodological settings, as a body of facts, a method of investigation and an explanation of associative living. (5) **Black**
171. **Juvenile Delinquency.** Heredity, environmental, cultural and social conditions which are causative factors in delinquency. (3F) **Pennock**

172. Delinquency Prevention. Modern philosophies about behavioral characteristics of children. Community and organizational programs of delinquency prevention. (3Sp)

Pennock

174. Criminology. Extent and nature of crime, and various factors related to criminal behavior. Theories of crime causation. Methods of law enforcement (3W, Sp)

Pennock

180. Group Dynamics. Group processes from the point of view of improving individual groups. Social action as a group process. (3W)

DeHart

184. Social Change. A systematic analysis of selected theories of social change with emphasis on the social psychological approach leading to an understanding of the change process and alternative strategies for effecting change. (3W)

Bylund

186. Methods of Social Research. Historical development of social research. Methods and techniques of analyzing and interpreting social data. (3F, W)

Kim

187. Sociology of Natural Resources. Designed for upper division and graduate students interested in the social organization and social systems associated with natural resources. In addition to a study of principles, it will include a field study of resource problems. (3F)

Andrews

188. Sociology of Leisure. A study of the theory of leisure, in terms of function and organizational structure in rural and urban America. Outdoor recreation associated with natural resources and social factors affecting leisure are among the subjects to be included. (3W)

Andrews

190. Seminar in Sociology. Selected sociological concepts or problems. (1F, W, Sp)

Staff

191. Legal Obligations in Husband-Wife Relations. The legal approach to the validity of marriage, the obligations imposed by the law upon husband and wife and the legal remedies in problems of marital discord. Legal history and precedents and the responses and lack of responses of the courts to current social trends. (2F, W)

Compton

192. Legal Obligations in Parent-Child Relations. The determination of illegitimacy, custody and adoption, and the legal rights and duties flowing therefrom. Other rights and legal obligations of parent and child. Prerequisite: Soc. 191. (2Sp)

Compton

195. Urban Sociology. The changing nature of American life as it has moved from predominantly rural to urban patterns. Significant

events that have led to urbanization. Guidelines that are useful for thinking about the urban world of tomorrow. (3)

Kim, Pennock

196. Race Relations. Historical perspective of minority group relations as they have existed in the United States and other parts of the world. Critical examination of the implications which these relations have for social life in the United States. Analysis of current aspects of integration vs. segregation as they affect individuals and groups in our present day society. (3F)

Pennock

199. Social Disorganization. A study of social problems from the standpoint of the social processes that bring them about; the genesis of antisocial attitudes in the individual, the family and the community; and of the conflict between these attitudes and those held by the larger defined group. (3F)

Pennock, Meservy

GRADUATE COURSES

201. Research in Sociology. A project for original study is organized and field work is carried out under supervision. Prerequisite: Soc. 186. Credit arranged. See thesis advisor. (F, W, Sp)

Staff

202. Advanced Sociological Theory. Critical analysis of current sociological theory about human society. Prerequisite: Soc 170 or permission of instructor. (5W)

Black

203. Independent Readings in Sociology. Reading and conferences on topics selected by the student and the advisor. Credit arranged. Instructor's permission required. (F, W, Sp)

Staff

207. Graduate Seminar. Short subjects within the field of Sociology pertinent to but not available in regular courses. Instructor's permission required. (2F, W, Sp)

Staff

210. Advanced Rural Sociology. Analysis of major developments in rural social thought; research and application aimed at solution of rural social problems throughout the world. (3)

Roskelley

225. Sociology of Deviant Behavior. Deviant behavior may be antisocial and not criminal or criminal and not antisocial. Research in depth to give the student greater insight and perspective into the social implications implicit within this concept. (3W)

Pennock

245. Sociology of Consumer Behavior. An analysis of consumer behavior theories and research techniques with emphasis on the social psychological approach. (3F)

Bylund

286. Survey Research. The student will be exposed to the various techniques available

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for obtaining data through survey research including both structured and unstructured questions. Focus will be upon (1) interview schedules and questionnaire development and construction, (2) interviewing and questionnaire techniques, (3) organizing data for analysis. (3W) **Bylund**

288. Practicum in Sociological Research. Supervised application of sociological research in field studies. Credit arranged. (F, W, Sp) **Staff**

289. Methods of Population Analysis. Use of rates, ratios, life tables, and related indices in analyzing, estimating, and projecting population in geographic areas. School, welfare, and labor force populations also will be considered. (3W) **Kim**

290. Methods of Population Analysis. (3Sp) **Kim**

301. Research and Dissertation. The dissertation project is to be selected, organized, and carried out under supervision. See Dissertation advisor. Credit arranged. (F, W, Sp) **Staff**

303. Advanced Independent Readings in Sociology. Readings and conferences at the PhD level, selected by the student in consultation with, and by permission of, the instructor. Credit arranged. (F, W, Sp) **Staff**

307. Advanced Graduate Seminar. Special subjects at the PhD level within the field of Sociology, pertinent to, but not available in regular courses. Instructor's permission required. (2F, W, Sp) **Staff**

400. Continuing Graduate Advisement. Graduate students who have received maximum thesis credit, but who have not completed the thesis or dissertation, must enroll for a minimum of three credits, until the degree is completed. If the student does not comply, his candidacy may be suspended and his supervisory committee dissolved. (3F, W, Sp, Su) **Staff**

Social Work Courses

GRADUATE AND UNDERGRADUATE COURSES

162. Mental Health. The prevention and treatment of mental illness and the maintenance of mental health in modern society. (3F, W) **Meservy**

170. Child Welfare. Evolution and current developments in programs for meeting needs of children: substitute parental care and adoptions, child labor laws, juvenile courts, provisions for unmarried parents, the handicapped child and the exceptional child. (3F, W) **Lewis**

172. Delinquency Prevention. (See Soc. 172) (3Sp) **Pennock**

173. The Field of Social Work. Social casework, social group work, and community organization. Objectives, processes, and personnel work. Prerequisite to SW174 and SW191, and must be taken prior to or concurrently with SW175a. (3F, W, Sp) **Lewis**

174. Introduction to Case Work. Theories and practices of social casework, with emphasis on problems and techniques of interviewing. Prerequisite: SW173. (3F, W) **Meservy**

175a. Introduction to Field Work. Various agencies dealing with social work and related areas. Includes field trips. (Taken concurrently or following SW173. (2F, W) **Meservy**

175b and c. Continuation of above for seniors. (2F, W) **Meservy**

177. Treatment of Children with Problems. Analysis and treatment of problems of children with special needs. (3Sp) **Meservy, Lewis**

178. Adolescence. Social adjustment of the adolescent as influenced by the nature of the culture in which he lives. Methods of working with adolescents. (3) **Staff**

180. Group Dynamics. See Soc. 180. **DeHart**

191. Social Work Methods. Basic concepts and methods used in casework, group work, community organization, social planning, and administration of social welfare agencies. (3F) **Lewis**

195. Social Work Seminar I. Social Work publications and other source materials applicable to the field. (1F, W, Sp) **Lewis, Meservy**

197. Service to the Aged. Description and discussion of trends and development of agencies and services for the aged. (3Sp) **Meservy**

198. Corrections. Historical perspective of crime and punishment as contrasted with modern concepts of penology which looks at the penitentiary as an institution of rehabilitation and resocialization of the juvenile and adult offender. (3) **Pennock**

199. Public Welfare. Examination and evaluation of public and private welfare programs including the program of the Department of Health, Education and Welfare as it applies to unemployment, old age assistance, aid to needy children, and physically or mentally handicapped. (3Sp) **Pennock**

GRADUATE COURSES

203. **Independent Readings in Social Work.** Credit arranged. Instructors permission required. (F, W, Sp) **Staff**

400. **Continuing Graduate Advisement.** Graduate students who have received maximum thesis credit, but who have not completed the thesis or dissertation, must enroll for a minimum of three credits, until the degree is completed. If the student does not comply, his candidacy may be suspended and his supervisory committee dissolved. (3F, 3W, 3Sp, 3Su.) **Staff**

Anthropology Courses

GRADUATE AND UNDERGRADUATE COURSES

105. **Comparative Value Systems and Education.** Theoretical and illustrative contributions of anthropology to a broad perspective on the variability of the educational processes and objectives in various primitive and complex societies over the world. (3W, Sp)

Keller, Sikorski

160. **Comparative Family Systems.** Basic anthropological concepts and theories relating social structure based on kinship, its analysis, evolution, functions, change, and variability over the world. (3F) **Keller**

162. **Religion, Society, and the Individual.** Anthropological analysis of religion as a cultural phenomenon and its functional relationships to society and the individual (3W) **Keller**

163. **Peoples-Mesoamerica.** An ethnological survey of cultures in Mexico, Guatemala, and the other Mesoamerican countries in various degrees of cultural progress, from the illiterate Indians of peripheral areas to the rural and urban "peasant" economies. Problems of partial acculturation, advanced accul-

turation, and the changing values and behavior that attend these problems are considered. (3W) **Sikorski**

165. **Culture and Personality.** The processes of personality development in terms of culture and social class. The nature and interpretation of personal experiences in different cultures. (3F, Sp) **Keller, Roskelley**

166. **American Indian Ethnology.** Economic, political, kinship, and religious structures of representative aboriginal cultures of the main culture areas of the North American Indian. Emphasis will be given to prehistoric peoples of the local Great Basin Area. (3W, Sp) **Keller, Sikorski**

167. **North American Prehistory.** Analysis of man and cultural evolution in the major cultural areas of prehistoric America. Includes archeological laboratory and field methods with investigations of local sites. (3Sp) **Keller, Sikorski**

GRADUATE COURSES

268. **Independent Studies in Anthropology.** Advanced readings or projects relating to theory, field or laboratory studies arranged by student and staff. Instructor's permission required. Credit arranged. (F, W, Sp) **Staff**

269. **Psychological Anthropology.** A comparative analysis of psychiatric disorders and behavior disturbances within social categories in western society and various societies of the world. (3Sp) **Keller**

400. **Continuing Graduate Advisement.** Graduate students who have received maximum thesis credit, but who have not completed the thesis or dissertation, must enroll for a minimum of three credits, until the degree is completed. If the student does not comply, his candidacy may be suspended and his supervisory committee dissolved. (3F, 3W, 3Sp, 3Su.) **Staff**

College of**Education**

DEAN: ORAL L. BALLAM, EdD, University of California at Los Angeles

OFFICE: Education 201

The graduate program in Education includes programs of study leading to the Master of Science, Master of Education, Master of Arts, Specialist in Education, Spe-

cialist in Educational Administration, and Doctor of Education degrees. For specific information on graduate programs, contact department heads.

Department of**Educational Administration**

HEAD: HOMER M. JOHNSON, Professor; EdD, Colorado State College

OFFICE: Education 206

ORAL L. BALLAM, Professor and Dean; EdD, University of California at Los Angeles

JOHN C. CARLISLE, Professor and Emeritus Dean, College of Education; EdD, University of California

LLOYD M. DRURY, Professor; Associate Director, Extension Services; EdD, University of Wyoming

BASIL C. HANSEN, Professor; EdD, Stanford University

TERRANCE E. HATCH, Professor; EdD, University of California at Los Angeles

ELLVERT H. HIMES, Professor; PhD, University of Utah

ARTHUR D. JACKSON, Associate Professor and Principal, Edith Bowen Laboratory School; MS, Utah State University; doctoral work, Stanford University and University of Texas

CHARLES O. RYAN, Associate Professor; EdD, University of Arizona

JAMES A. JACOBSON, Instructor; MS, Utah State University; doctoral work, Utah State University

The Department of Educational Administration provides programs leading to the graduate degrees of Master of Education, Master of Science, Specialist in Educational Administration (six-year program) and Doctorate of Education. All programs have been accredited by the National Council of Accreditation of Teacher Education. This in turn means that the recipient of

the Specialist in Educational Administration or the Doctor of Education has met the graduate requirements for membership in the American Association of School Administrators.

Programs offered by the Department will satisfy the certification requirements outlined by the Utah State Board of Education. Effective June 14, 1967, candidates may

seek either a basic professional or a professional certificate for positions as an elementary principal, secondary principal and superintendent. To receive a basic professional endorsement requires a Master's degree or 55 quarter hours in an approved program in school administration. The professional endorsement requires a planned two-year graduate program in Educational Administration. Other specific requirements are outlined in the regulations of the State Board of Education. Details of these programs are available from the Office of the Department of Educational Administration.

Master's Degree. Students are prepared for principalships of elementary or secondary schools. Each program is based on a core of administration courses plus curriculum and psychology courses for the appropriate level. This degree will meet the principal's certification requirements in certain states.

Specialist in School Administration. This program is designed to prepare general school administrators or individuals who want advanced training as elementary or secondary school principals. The first year of the two year program may culminate in the Master's degree. The student is not admitted to formal candidacy for the specialist degree until completion of the first year. The second year has a primary emphasis on general administration plus supporting courses in education, psychology and social sciences. For those specializing in the principalships, certain courses more applicable to the position may be substituted for the general administration courses. A person must have three years of successful professional experience or its equivalent to qualify for this degree. This degree will meet the

new certification requirements for the Professional Elementary and Secondary Principalship in the state of Utah.

Doctor of Education Degree. This program is oriented to specifically equip the candidate to be a school superintendent or central office administrator. Those desiring advanced work as an elementary or secondary school administrator may seek this degree. In addition, those desiring positions as professors of administration in higher education should consider this program. The first year of the Doctoral program is essentially the same as the second year of the Specialist program. The Doctoral program is distinguished from the Specialist program, however, by the development on the part of the student of a greater sophistication in the area of administration and refinement of his ability to conduct and evaluate research. A person must have three years of successful professional experience to qualify for this degree.

The College of Education also cooperates with the College of Engineering in providing a program leading to a Doctor of Education degree in industrial education.

Educational Administration Courses

GRADUATE AND UNDERGRADUATE COURSES

154. *History of Education.* Major educational movements from early Greek to the present, with emphasis on purposes, organization, instructional procedures, curriculum, etc., and their bearing on today's education. (3Sp, Su)
Hansen

GRADUATE COURSES

207. *Elementary School Administration.* Operation and management of the elementary school. (3W, Su)
Jackson, Ryan

236. Secondary School Administration. Topics in secondary school administration, including problems of teacher-pupil personnel, the principal as supervisor, and managing the activity program. Designed for experienced school principals, and those preparing for the administrator's certificates in secondary education. (3W, Su) **Hatch**

254. Organization and Administration of Education. The work of the school administrator and the principles upon which the profession of school administration is practiced. Federal, state, and local relations to education. (3F, Sp, Su) **Hatch, Hansen, H. Johnson, Ryan**

258. Seminar in Educational Administrative Behavior. This course is designed to give prospective administrators opportunity to relate coursework and training to an analysis and solution of real or simulated problems in educational administration. Limited to MEd or Specialists in Educational Administration candidates only, or by permission of instructor. (3Su, W) **Ballam, Johnson**

260. Historical and Philosophical Foundations of Education. Deals with major philosophies of education in their historical setting and their effect upon subsequent development of the American school system. (3F, Su) **Hansen**

261. Organization and Administration of Special Education. This course is designed to provide public school administrators with background and training for the administration of special education. It will deal with the background and purposes of special education, the systems and organization for programs and financing and the legal implications related to programs. The student will become acquainted with identification in procedures and community, school and parent relationships. Involvement will be provided in current issues and trends in special education. (3F, Su) **Ryan**

262. Organization and Administration of Guidance. An analysis of concepts, plans, relationships, and problems involved in the effective development and operation of guidance services and activities at all levels of education. (3Sp, Su) **Himes**

264. Instructional Leadership in Education. Principles and practices of school supervision, including qualifications and responsibilities of supervisors of instruction in public education. The role of the principal, the curriculum director and other administrators in instructional leadership will be considered. (3F, Su) **Allred, Farrer**

265. Computer Application and Systems Design in Education. This course will provide education administrators and others with an

understanding of computer capabilities. To fully understand the capabilities, it is necessary to gain knowledge about how a computer actually works. Having established some fundamentals of the science, the student will gain an understanding and application of computers to media in education, operations research, business administration, content research, student scheduling, and simulation of educational problems. Basic to computer applications, the student will become knowledgeable in the area of flow charting, systems designing and systems analysis in the educational setting. (3Su, Sp) **Staff**

266. Introduction to Research in Education. This course is to provide teachers and school administrators with research tools that they may apply directly to their practical problems. The specific objectives of the course are: (1) to give students an appreciation of scientific methods of problem solution; (2) to acquaint students with a research literature in Education and teach them how to use it; (3) to provide training and experience in action research; (4) to teach students how to plan, carry out, and report a project for the Master of Education degree. Prerequisite or taken concurrently: Ed 164. (3F, Sp, Su) **Carlisle**

267. Research in Psychology and Education. Deals with identifying a problem for the thesis, reviewing and evaluating research literature, and designing and carrying out the research project. A portion of the student's thesis or seminar report is prepared as the term paper. The instructor schedules individual conferences to assist the student in the initial planning of his thesis or seminar report. Prerequisite: Psy 112. (3F, Su, Sp) **Shaver**

269. Comparative Education. A study of the school system and educational problems of Europe, Latin America, the Middle East, Far East, and Russia. Students from foreign lands and resident faculty members personally acquainted with various educational programs are utilized as resource persons. (3W, Su) **Hansen**

270. Public Relations in Education. Objectives, guiding principles, techniques and media for an improved school public relations program. (3W, Su) **Hansen, Ballam**

274. Legal Aspects of School Administration. Emphasizes responsibilities and functions of local and district school administrators. Interpretation of legal status, form and procedure, as established by statutes, legal opinions, and court decisions. (2Sp, Su) **Hatch**

276. Field Experience in School Administration. Provides introductory experiences in school administration. Students work a minimum of five hours weekly under the direction

of an administrator in the public schools, either elementary or secondary. The University supervisor will direct programs and meet in seminar periodically. (F, W, Sp, Su, arranged)
Hatch, Jackson

283. Reading and Conference. Provides for individually directed study in subjects of special interest and preparation. Credit arranged. (F, W, Sp, Su) Staff

285. Research and Thesis Writing. Individual work in thesis writing and the preparation of a seminar report with guidance and criticism. Credit arranged. (F, W, Sp, Su) Staff

350. Seminar in Administrative Theory and Research. The seminar will concentrate on current theories about administration and the contribution of behavioral science research to the problems of organization and administrative behavior. An expected by-product is the student's growing awareness of significant problems in educational administration which can be researched. The appropriateness of various research methodologies to specific kinds of problems will be considered, although the seminar does not stress formal instruction in either research methodology or statistical analysis. Doctoral students only. (3F)

Johnson, Hatch

351. Seminar in Communications Theory and Research. Internal communication of the organization constitutes an essential ingredient of the administrator's effectiveness. In addition, the change of behavior of individuals requires, fundamentally, a communications process. Of equal importance is the problem of communications between the organization and its supporting public. This seminar will help the student gain insight into the variables that affect this total communications process. Research will be reviewed to better understand attitude and opinion change. Doctoral students only. (3W)

Johnson, Ballam

352. Seminar in Problems of Educational Administration. Basic to the understanding of the administrative process is the ability of the student to see clearly the relationship between theory and practice. By employing certain simulation techniques it is hoped that the student will be able to employ theory in the analysis and solution of problems. In addition, the doctoral student should begin to conceptualize issues in international relations, cultural anthropology, comparative education and economics. Opportunities will exist for the teachers involved to evaluate both students and program. Doctoral students only. (3Sp)

Johnson, Ballam, B. Hansen

355. School Building Programs. School housing surveys, location and capacity of schools, instructional needs as a basis for planning,

standards for equipment, checking plans and specifications, business and legal provisions governing financing and construction of new buildings, bids and contracts. (3F, Su)

H. Johnson

360. Philosophy of Education, Advanced. An analysis of the major philosophies of education and their implications for current educational practices. (3Sp, Su)

Hansen

361. Readings in Foundations of Education. Considers problems of education in terms of their sociological, historical, and philosophical foundations. (3W, Su)

Hansen

362. Group Processes in Educational Leadership. Analysis of the work of the school administrators and supervisors in dealing with various groups concerned with public education, school facilities, boards of education, parent-teacher groups, and the like. Research from studies in group dynamics will be drawn upon. (3W, Su)

H. Johnson

367. Administration of School Personnel. Principles and practices in management of teachers, other school employees, and pupils. (3W, Su)

Ballam

368. Higher Education. A study of the development and current status of education beyond the high school in America. (3W)

Himes

374. Practicum in Public School Surveys. The students in the class will participate in making a field study or survey of a school district. Classroom discussions will be concerned with practical problems of the particular district. Educational literature dealing with the area of school surveys will also be extensively considered. Open only to advanced students in school administration with the specific approval of the instructor. Time and credit arranged. (W)

H. Johnson

381. School Finance. Historical background of school finance; principles and practices involved in collecting and distributing school revenues, with special reference to conditions in Utah. (3F, Su)

Ballam, Ryan

382. School Business Management. A study of the factors involved in the efficient business management of school systems and individual schools. For school administrators, school business managers, clerks and students preparing for these positions. (3Sp, Su)

Ryan

384. Internship in School Administration. Provides extensive experience for the advanced student working on the Doctor of Education Degree in School Administration. Class members work a minimum of one quarter full time under the direction of an administrator in the public schools. Credit arranged. (F, W, Sp)

H. Johnson, Ballam

385. **Field Studies and Thesis.** Formerly 375. Individual work on research problems in the EdD program. Credit arranged. (F, W, Sp, Su)

Staff

400. **Continuing Graduate Advisement.** Graduate students who have received maximum

thesis credit, but who have not completed the thesis or dissertation, must enroll for a minimum of three credits, until the degree is completed. If the student does not comply, his candidacy may be suspended and his supervisory committee dissolved. (3F, 3W, 3Sp, 3Su.)

Staff

Department of

Elementary Education

HEAD: MALCOM ALLRED, Professor; EdD, Colorado State College

OFFICE: Education 205

BRYCE E. ADKINS, Associate Professor; PhD, State University of Iowa

GAIL JOHNSON, Associate Professor; EdD, University of Oregon

DOROTHY JEAN PUGMIRE, Associate Professor; MA, University of Michigan; graduate work at Merrill-Palmer School and University of Maryland

EDITH SMITH SHAW, Associate Professor and Director, Elementary Student Teaching; MS, Northwestern University

JAY A. MONSON, Assistant Professor; EdD, Utah State University

MORRIS MOWER, Assistant Professor; EdD, Colorado State College

EVELYN L. WIGGINS, Assistant Professor; MS, Utah State University

JOHN R. WILLIAMS, Assistant Professor; MS, Brigham Young University

Edith Bowen Laboratory School Staff

ARTHUR D. JACKSON, Associate Professor and Director; MS, Utah State University; doctoral work, Stanford University, University of Texas, University of Arizona

JOAN C. BOWDEN, Assistant Professor; MEd, Utah State University

BARBARA B. HOWELL, Assistant Professor; MS, Utah State University

IVAN PEDERSEN, Assistant Professor; MS, Utah State University

KATHRYN S. SMITH, Assistant Professor; MS, Utah State University

HELEN J. TANNER, Assistant Professor; MS, Utah State University

THOMAS TAYLOR, Assistant Professor; MS, Utah State University

R. EYRE TURNER, Assistant Professor; MS, Utah State University

Master's Degree. The Department of Elementary Education offers programs leading to the degrees of Master of Arts, Master of Education, and Master of Science in teaching, or supervision and curriculum development. Those desiring to meet graduation requirements in these areas at the Master's degree level should matriculate in the Department of Elementary Education.

Doctor of Education Degree. The Department of Elementary Education, in cooperation with the Department of Secondary Education, offers the Doctorate of Education Degree. This degree is designed for those planning to be college teachers, or curriculum coordinators or supervisors in school districts or state school offices. Candidates may matriculate in the Department of Elementary Education

or in the Department of Secondary Education.

Education Courses

GRADUATE COURSES

204. Elementary School Curriculum, Advanced Course. Designed for experienced teachers. It deals with new concepts in elementary curriculum resulting from recent research in the field. Class members will have opportunity to develop curriculum materials in their areas of interest. (3F, Sp, Su) **Adkins, Allred**

205. Improvement of Kindergarten Education. An advanced course in kindergarten education for experienced teachers. It will include an evaluation of the kindergarten program based on the latest research in the areas of psychology, child development, education, and sociology. **Pugmire**

207. Elementary School Administration. See Educational Administration 207. (3F, Su) **Staff**

213. Diagnosis of Reading. For teachers, supervisors and others interested in remedial reading instruction. Concerned with causes of reading disability, diagnostic tests, and procedure used in remedial reading. Prerequisites: Education 107 or two years teaching experience in the elementary school. Concurrent enrollment in Education 190. (3W, Su) **G. Johnson, Mower**

214. Remedial Reading Instruction. Designed to follow Education 188. Considers the nature of remedial reading instruction, selection of remedial students, group and individual instruction, methods and materials used in remedial reading programs. Concurrent enrollment in Education 190. (3Sp, Su) **G. Johnson, Mower**

216. Practicum in Remedial Reading. Provides opportunity for the student to work with children in need of remedial help in reading. Enrollment only with the consent of the instructor. (3W, Sp, Su) **G. Johnson, Mower**

219. Seminar in Elementary Education. Formerly 245. Considers those areas of elementary education in which members of the class desire to gain modern authoritative viewpoints. Opportunity for both individual and group work. (3Sp, Su) **Staff**

220. Creative Education in the Elementary School. Exploration of research concerning creativity in education and ways and means of utilizing basic principles in this area in the improvement of classroom practices. (3W, Su) **Shaw**

225. Improvement of Reading in the Elementary School. In addition to a concern for an adequate developmental reading program, emphasis will be placed on helping the child who is having reading difficulties. Prerequisite: Ed 107 or teaching experience in elementary school. (3F, Su) **G. Johnson Mower**

226. Improvement of Science in the Elementary School. For experienced teachers. Deals with newer concepts in curriculum and methods of instruction in science in the elementary schools. Prerequisite: Ed 109 or teaching experience in elementary school. (3W, Su) **Adkins**

227. Improvement of Arithmetic and Mathematics in the Elementary School. For experienced teachers. Deals with newer concepts in curriculum and methods in mathematics instruction in the elementary school. (3W, Su) **Adkins**

228. Improvement of Social Studies in the Elementary School. For experienced teachers. Deals with newer concepts of curriculum and methods of instruction in social studies in the elementary school. Prerequisite: Ed 108 or teaching experience in elementary school. (3Sp, Su) **Allred, Monson**

229. Improvement of Language Arts in the Elementary School. For experienced teachers. Deals with newer concepts in curriculum and methods of instruction in language arts in the elementary school. (3Sp, Su) **Wiggins**

259. Supervising Student Teaching. Considers ways and means of providing desirable experiences for student teachers in the public schools. The role of the classroom teacher and the college supervisor will be analyzed. (3F, Su) **Shaw, Wiggins**

264. Instructional Leadership in Education. Principles and practices of school supervision, including qualifications and responsibilities of supervisors of instruction in public education. The role of the principal, the curriculum director and other administrators in instructional leadership will be considered. (3W, Su) **Allred, Farrer**

266. Introduction to Research in Education. See Educ Adm 266. (3F, Su) **Carlisle**

267. Research in Psychology and Education. See Educ Adm 267. (3F, Su) **Borg**

283. Reading and Conference. Provides for individually directed study in subjects of special interest and preparation. Credit arranged. (F, W, Sp, Su) **Staff**

285. Research and Thesis Writing. Formerly 271. Individual work in thesis writing with guidance and criticism. Credit arranged. (F, W, Sp, Su) **Staff**

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364. **Theories of Teaching.** Analysis of various teaching methodologies used in classrooms. For doctoral students only. (3Sp, Su)

Allred, Farrer

365. **Curriculum Development.** Formerly 315. Advanced problems in curriculum building. Philosophic bases of the curriculum, current practices, and organization for curriculum study. Doctoral students only. (3W, Su)

Farrer, Haas, Allred

366. **Internship in School Supervision.** Provides extensive experience for the advanced student working on the Doctor of Education degree in Curriculum Development and Supervision. The student works a minimum of one quarter full time under the direction of an administrator, in a public school or university. Doctoral student only. Credit arranged. (F, W, Sp)

Staff

385. **Field Studies and Thesis.** Individual work on research problems in the EdD program. Credit arranged. (F, W, Sp, Su)

Staff

400. **Continuing Graduate Advisement.** Graduate students who have received maximum thesis credit, but who have not completed the thesis or dissertation, must enroll for a minimum of three credits, until the degree is completed. If the student does not comply, his candidacy may be suspended and his supervisory committee dissolved. (3F, 3W, 3Sp, 3Su.)

Staff

For additional courses, see Educational Administration, Instructional Media and Library Science, Psychology, and Secondary Education departments.

Department of

Health, Physical Education and Recreation

HEAD: H. B. HUNSAKER, Professor; MS, University of Oregon; doctoral work, University of California, University of Washington, and University of Utah

OFFICE: Smart Gym 304

DALE O. NELSON, Professor; PhD, University of Southern California

LOIS DOWNS, Associate Professor; MS, Utah State University; doctoral work, University of Utah

LINCOLN H. MCCLELLAN, Associate Professor; EdD, University of Oregon

PAULINE FULLER, Assistant Professor; MS, Utah State University; doctoral study, University of Utah

ARTHUR H. MENDINI, Assistant Professor; MS, Utah State University; graduate work, Utah State University

JANICE PEARCE, Assistant Professor; MS, Washington State University

H. DALE RASMUSSEN, Assistant Professor; MS, Utah State University

Master of Science Degree. The Department offers courses leading to the Master of Science degree in Health Education, Physical Education, or Recreation. Before admission to candidacy for the degree, a student must complete the equivalent

of a Bachelor's Degree in Physical Education at USU and additional requirements as prescribed by the School of Graduate Studies. Required courses are: PE 206, 292, 294, 271, 295, 299. English 111, or 211, Psy. 112.

Physical Education Courses

GRADUATE AND UNDERGRADUATE COURSES

106. Kinesiology. The science of movement. Includes a study of the structure of the human body in terms of its use in activity; a mechanical analysis of all types of activity based upon principles of good body mechanics; methods of developing and using the human body. Prerequisite: Physiol. 20. (3W, Su) **D. Nelson**

107. Physiology of Muscular Activity. A study of the physiological functions of the human body in various types of activity. The course includes a detailed study of the physiological changes that occur during all kinds of activity. Physiological functions of the human body in various types of activity. Physiological principles are then applied to Physical Education. Prerequisite: Physiol. 104. (3F, W) **D. Nelson**

108. Adapted Physical Education. Basically a study of the adapted Physical Education program. Includes the administration of an adapted Physical Education program. Also a study of abnormal problems in body mechanics, athletic injuries and their treatment, athletic training procedures, and principles dealing with abnormal conditions found in the Physical Education program. Prerequisite: Physiol. 20. (3F, Sp) **D. Nelson**

177. Physical Education in the Elementary School. Designed to give a philosophy of Physical Education in the elementary school. Emphasis is on program planning, teaching techniques, the direction and participation in elementary Physical Education activities and the selection of activities that will help satisfy the needs of the elementary school child. (3F, 3W, 3Sp) **Downs**

182. Materials and Methods in Elementary Physical Education. Designed to gain an understanding of the elementary school Physical Education program. Curriculum, facilities, equipment, and the teaching of activities are emphasized. Emphasis is also placed on activities as specified in the Utah State Course of Study for the elementary school. (3W, 3Sp) **Staff**

183. Interpretation of Physical Education Objectives. Results and values of Physical Education activities in terms of development, adjustment and standards. (3F, 3W) **Hunsaker**

184. Administration of Physical Education. Administration procedures in Physical Education in the high school; curriculum and program planning. (3W, Sp) **Hunsaker**

192. Tests and Measurements in Physical Education. Practical studies of tests and technique of test construction. (3F, 3Sp) **Hunsaker**

GRADUATE COURSES

206. Analysis of Sports Performance. A mechanical and physiological analysis of all types of sports performance based upon principles of movement and body mechanics. Advanced methods of developing and using the human body are emphasized. The course includes slow motion photography, physiological basis and actual performance for employing the analysis. (3W, Su) **D. Nelson**

207. Problems of Athletics. A study of problems in athletics relative to public relations, athletic management, administration of athletics, purchases of equipment, schedules, plant layout, etc. (3Sp) **Hunsaker**

250. Reading and Conference. Provides for individually directed study. Credit arranged. **Hunsaker, Nelson, Downs**

271. Research and Thesis Writing. Credit arranged. (F, W, Sp, Su) **Staff**

275. Philosophy of Physical Education. A study of the divergent origins, conditions, leaders, and forces giving rise to current basic beliefs about Health, Physical Education and Recreation. Development of individual professional philosophies. (3W) **McClellan**

282. Curriculum in Physical Education. A course dealing with curriculum development in Physical Education, including philosophic basis of the Physical Education curriculum for elementary, junior high and senior high school. Current procedures and organization for the Physical Education program of elementary, junior and senior high school. (3Sp) **McClellan**

290. Problems in the Development of Physical Fitness. Examination of the scientific basis of physical fitness. Principles of development for strength, flexibility, and endurance. Evaluation of physical fitness and the development of physical fitness programs. (3) **D. Nelson**

294. Research and Evaluation in Physical Education. Methods, techniques, purposes and interpretation of various kinds of research. Practical application in the conduct of a research project is utilized during the class. (3F, 3Sp) **D. Nelson**

295. Problems in Physical Education. Various selected problems in Physical Education are studied through the use of literature and discussion as they apply to the individual and

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the group. Individual problems are emphasized. (3F, 3Sp) **Hunsaker**

299. Physical Education Seminar. The group is offered the opportunity of investigating selected bodies of knowledge in Physical Education and discussion materials grow from the depth of investigation. Credit arranged. (W) **Hunsaker**

400. Continuing Graduate Advisement. Graduate students who have received maximum thesis credit, but who have not completed the thesis or dissertation, must enroll for a minimum of three credits, until the degree is completed. If the student does not comply, his candidacy may be suspended and his supervisory committee dissolved. (3F, 3W, 3Sp, 3Su.) **Staff**

Recreation Education Courses

GRADUATE AND UNDERGRADUATE COURSES

178. Problems and Trends in Outdoor Recreation. Problems associated with providing adequate outdoor recreation opportunities. A study of (1) past and present trends in the availability and use of outdoor recreation areas, (2) types of outdoor recreation areas and the present and future needs for each type, (3) the roles of different agencies in providing outdoor recreation, including federal, state, and local government agencies, (4) laws governing the recreational usage of outdoor areas. (3W) **Burnett**

179. Camping and Camp Crafts. Training in camp techniques and camp leadership. Different types of camps and their organization, supervision, equipment and safety. Several short hikes and an overnight camp are conducted during the course. (2Sp) **Mendini**

196. Organization of Recreation. Problems of organization and administration of community recreation departments, including facilities, program of activities, and office management. Problems of recreation surveys, legislation, property acquisition, finances, construction and maintenance, and securing community and school co-operation in a united recreational program. (3Sp) **Burnett**

GRADUATE COURSES

293. Recreation Leadership. The role of recreation; community program planning, meth-

ods of developing leadership in the areas of public and school recreation, youth serving organizations and community groups. (3Su) **Burnett**

400. Continuing Graduate Advisement. Graduate students who have received maximum thesis credit, but who have not completed the thesis or dissertation, must enroll for a minimum of three credits, until the degree is completed. If the student does not comply, his candidacy may be suspended and his supervisory committee dissolved. (3F, 3W, 3Sp, 3Su.) **Staff**

Health Education Courses

GRADUATE AND UNDERGRADUATE COURSES

117. Health Education Workshop. School and community health workshop. A workshop designed to utilize services of school, public, and voluntary health agencies in focusing on critical issues in personal and community health. Various agencies participate in the planning and implementing of this course for students in elementary and secondary education, public health, and allied health fields. (2Su) **Pearce**

145. Alcoholism and Tobacco Education. The alcohol and tobacco problem are considered from the physiological, psychological, sociological, educational, historical, and legal aspects. The development of a correlated attack on the problems are emphasized. (3Sp, 3Su) **D. Nelson**

151. Public and School Health Administration. Organization, administration, and functions of health agencies. (See Public Health Class list.) (3W) **Staff**

158. Curriculum Organization in Health. Organization of the school health program with emphasis on the scope and sequence of health content from primary grades through the secondary school. Prerequisites: Public Health 15 and Health Education 163. (3Sp) **Pearce**

163. Methods and Materials in Health Education. The nature of Health Education in the school and community; the health needs of the school child; the health education curriculum; methodology in the teaching of health; the resource materials of health education; and the measurement and evaluation of the total health program. (3) **Pearce**

Department of

Instructional Media

HEAD: LESTER C. ESSIG, JR., Associate Professor; EdD, University of Indiana

OFFICE: Library 222

MILTON C. ABRAMS, Professor; PhD, University of Utah

ELDON M. DRAKE, Professor; PhD, Iowa State University

IDA-MARIE LOGAN JENSEN, Associate Professor; MALS, University of Denver

DON C. SMELLIE, Associate Professor; PhD, University of Indiana

R. KENT WOOD, Associate Professor; MA, University of Denver; doctoral work, Western Michigan University

G. LEON BEUTLER, Assistant Professor; MS, Utah State University

D. LAMONT CHAPPELL, Assistant Professor; MSLS, University of Washington

KATHRYN C. GARDNER, Assistant Professor; MAT, University of Indiana

KARL O. MUSTONEN, Assistant Professor; MALS, University of Minnesota

J. MARK SORENSEN, Assistant Professor; MS, Utah State University

LADELL HOTH, Instructor; MSLS, Pratt Institute

REED PAINTER, Instructor; MS, Utah State University; MA, University of Denver

MAX PETERSON, Instructor; MS, Utah State University

A. J. SIMMONDS, Instructor; MA, Utah State University

The Instructional Media Center program is a combination of Library Science and Instructional Communication. The Instructional Media Center concept is the application of Library Science to all educational materials.

Divisions of the American Library Association and the National Education Association prepared a joint statement concerning the role of librarians in the Instructional Media Centers. This statement became a part of the American Library Association Standards for School Library Programs in 1960.

In recent years, many new types of instructional media and equipment have been developed, such as educational television programs, specialized training devices and new projections materials. At the same time, more familiar media such as books, films, and record-

ings have been made increasingly effective through modern techniques of illustration, improved design, and new production processes.

Because of the broad variety of media now available and the rapid increase of production within each medium, teachers are faced with a vast reservoir of instructional materials from which to choose. This means that teachers require more and more help from specialists to locate, evaluate, select, produce and use instructional media to best advantage. In order to provide such help, specialists need to have a working knowledge of the entire range of media, the potential contributions each can make to learning, and effective methods to use.

Master of Education. The Master of Education program is designed to prepare these needed specialists for positions in libraries which

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have already converted into the new and broader Instructional Media Center or to help the traditional library make this transition as community and educational needs require.

The following program meets the requirements for a Master of Education Degree:

MASTER OF EDUCATION IN INSTRUCTIONAL MEDIA

For students new to the field of Instructional Communication and Library Science, with no previous work in the Department.

Required Courses:		Credits
IMLS 101	Library Reference Services	3
IMLS 111	Book Selection	3
IMLS 112	Reading Guidance	3
IMLS 121	Cataloging and Classification	3
IMLS 132	Elementary School Library Administration	3
IMLS 133	Secondary School Library Administration	3
IMLS 135	Library Practice (or professional experience)	3
		18
Instructional Communication Background		
IMLS 155	Utilization of Audio-Visual Media	3
IMLS 165	Production of Audio-Visual Materials	3
IMLS 166	Local Production of Audio-visual Materials	3
IMLS 181	Developing the School's Audiovisual Program	3
Spch 181	Television Production	3
		15
Library Science		
IMLS 136	History of Books and Libraries	3
IMLS 225	Computer and Machine Application in Library Science	3
		6
Instructional Communication		
IMLS 191	Instructional Media Communication Theory	3
IMLS 251	Evaluation and Selection of Instructional Materials	3
		6
Education		
El Ed 204	Elementary School Curriculum or	3
Se Ed 230	Secondary School Curriculum	3
Se Ed 164	Measurement and Evaluation in Education	3
Ed Ad 266	Introduction to Research in Education	3

Ed Ad 264	Instructional Leadership in Education	3
Ed 285	Research and Thesis Writing	3
		15
		60
		masters -48
		make-up (1 quarter) 12

MASTER OF EDUCATION IN INSTRUCTIONAL MEDIA

For students who were undergraduate Instructional Media minors with emphasis in Instructional Communication in the department.

Required Courses:		Credits
Library Science Background		
IMLS 101	Library Reference Services	3
IMLS 112	Reading Guidance	3
IMLS 132	Elementary School Library Administration	3
IMLS 133	Secondary School Library Administration	3
IMLS 135	Library Practice (or professional experience)	3
		12
Instructional Communication		
IMLS 191	Instructional Media Communication Theory	3
IMLS 251	Evaluation and Selection of Instructional Materials	3
Spch 184	Educational Broadcasting	3
Art 57	Photo Fundamentals	3
		12
Library Science		
IMLS 136	History of Books and Libraries	3
IMLS 225	Computer and Machine Application in Library Science	3
Eng 122	Children's Literature	3
Eng 123	Literature for Adolescents	3
Eng 35	Great Books and Ideas	3
		9
Education		
El Ed 204	Elementary School Curriculum or	3
Se Ed 230	Secondary School Curriculum	3
Se Ed 164	Measurement and Evaluation in Education	3
Ed Ad 266	Introduction to Research in Education	3
Ed Ad 264	Instructional Leadership in Education	3
Ed 285	Research and Thesis Writing	3
		15
		48

MASTER OF EDUCATION IN INSTRUCTIONAL MEDIA

For those students who were undergraduate Instructional Media minors with emphasis in Library Science in the department.

Required Courses: Credits

Instructional Communication Background		
IMLS 156	Instructional Media in Education	3
IMLS 166	Local Production of Audio-visual Materials	3
IMLS 181	Developing the School's Audiovisual Program	3
Spch 181	Television Production	3

Instructional Communication

IMLS 191	Instructional Media Communication Theory	3
IMLS 251	Evaluation and Selection of Instructional Materials	3
Spch 184	Educational Broadcasting	3
Art 57	Photo Fundamentals	3

Library Science

IMLS 136	History of Books and Libraries	3
IMLS 225	Computer and Machine Application in Library Science	3
Eng 122	Children's Literature	3
or		
Eng 123	Literature for Adolescents	3
or		
Eng 35	Great Books and Ideas	3

Education

El Ed 204	Elementary School Curriculum	3
or		
Se Ed 230	Secondary School Curriculum	3
Se Ed 164	Measurement and Evaluation in Education	3
Ed Ad 266	Introduction to Research in Education	3
Ed Ad 264	Instructional Leadership in Education	3
Ed 285	Research and Thesis Writing	3

Instructional Media and Library Science Courses

101. Library Reference Services. Builds a knowledge of the scope, significant characteristics, principles and philosophy of information retrieval and bibliographic techniques. Each student is given the opportunity to explore the literature and important reference tools augmenting the major disciplines. (3Sp, Su)

Logan, Simmonds, Wood

106. Public Documents. The study of bibliographies, catalogs, indexes, and other sources which are the keys in using public documents. Federal, state, and United Nations documents, which constitute vast sources of knowledge will be introduced. (3Sp) Mustonen

111. Book Selection. Presents general principles of selection, specific criteria for the selection of books, magazines, and related material for schools and public libraries. Studies the use of standard book selection aids and book reviewing publications. (3Sp, Su)

Hoth, Sorensen, Wood

112. Reading Guidance. Consideration is given to the needs of librarians and other persons concerned with reading programs in school and public libraries. Special problems and interests related to library work with children, young adults and adults are treated. Case studies dealing with reading programs and assistance to readers are emphasized. (3F, Sp)

Gardner, Wood, Staff

121. Cataloging and Classification. Fundamental methods and techniques of simplified cataloging and classification. Library processing of books, near and non-book materials are covered. Basic rules of entry, descriptive cataloging, filing, and the Dewey Decimal Classification System are stressed. (3F, Su)

Drage, Gardner, Hoth, Wood

132. Elementary School Library Administration. Consideration is given to the administration and organization of elementary school libraries. The philosophy, scope of services, curriculum enrichment, special reference problems, and auxiliary programs are covered with special attention given to student assistant programs and community relations. Children's services of public libraries are included. (3W, Su)

Gardner, Wood, Staff

133. Secondary School Library Administration. A study of practices in secondary school libraries and an introduction into organization of the several types of libraries and techniques of administration of libraries generally. The philosophy and scope of services, relationship to school curriculum, and library planning for secondary schools is stressed. The expanded services and the development of the Instructional Materials Center concept is given attention. (3W, Su)

Abrams, Gardner, Wood

135. Library Practice. Observation and supervised practice under the direction of library personnel. Designed to give the student practical experience in the various types of libraries and to bridge the gap between classroom theory and practice in the field. 90 clock hours of fieldwork, including a weekly conference with the supervisor are offered. Prerequisites: IMLS 101, 111, 121, and 132 or 133. (3F, W, Sp, Su) Gardner, Smith, Wood

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136. History of Books and Libraries. The history of bookmaking, printing, and libraries. (3W, Su) **Simmonds, Wood**

139. Readings and Conference. Provides for individually directed study. Limited to Library Science minors. Prerequisite: Instructor's consent. Credit arranged. (F, W, Sp, Su) **Staff**

155. Utilization of Audiovisual Media. A basic course designed to give a broad overview of audiovisual materials and equipment and their contributions in improving the educational experiences of the learner. Studies and compares the advantages and limitations of the major types of instructional media with training in the selection, operation and proper utilization of educational equipment and materials, with some practice in the design and preparation of more easily teacher-made materials. (3F, W, Su) **Beutler, Drake, Essig**

156. Instructional Media in Education. Reviews the structure and utilization of the newer media and instructional systems in education, and applies basic concepts of communication to problems in teaching and learning. Prerequisite: IMLS 155 or with instructor's permission. (3Sp) **Essig**

165. Production of Audiovisual Materials. Acquaints those in the educational field with the possibilities of creating instructional materials to meet their own professional needs. Teaches basic techniques for the production of a wide variety of both opaque and transparent visuals for display, study, and projection purposes. (3F, W, Sp, Su) **Staff**

166. Local Production of Audiovisual Materials. Advanced skills are taught in the four production areas: illustration, mounting and preservation, lettering, and coloring. Training in message design is provided through the creation of instructional materials to be used in the student's own teaching area. Prerequisite: IMLS 165. (3W, Su) **Smellie**

181. Developing the School's Audiovisual Program. The steps in initiating and administering an audiovisual program for a single school are considered. Included are the study of organization, personnel, budgets, selection and circulation of materials and equipment,

providing for a wide variety of audiovisual services, and the planning for building and classroom facilities to effectively utilize instructional materials. Prerequisite: IMLS 155. (3W) **Essig**

191. Instructional Media Communication Theory. Considers research and theory applicable to the classroom and to the teaching-learning process. Communication models will be studied, and consideration given to communication barriers, the influence of perception on learning, strength and weaknesses of pictorial and verbal modes of representation, techniques and methods of teaching motor skills, concept development and attitude formation. (3Sp) **Essig**

225. Computer and Machine Application in Library Science. An overview of development, experimentation, and research in the automation of libraries including storage, retrieval, and application to acquisitions, serials control, circulation management and related technical library services. (3Sp, Su) **Chappell**

238. Workshop in Librarianship. Designed for teachers, librarians, and administrators to study the current needs of libraries in schools and communities in relation to the problems of education and the institutions served. Resources and organization of new media, development techniques for implementation of the instructional materials center concept, as well as a review of the new books, magazines and related materials will be stressed. (2Su) **Wood and Visiting Staff**

251. Evaluation and Selection of Instructional Materials. Training and practical experience is given in the evaluation and the selection of a variety of Instructional Materials. Prerequisite: IMLS 155, or instructor's permission. (3F) **Essig, Smellie**

400. Continuing Graduate Advisement. Graduate students who have received maximum thesis credit, but who have not completed the thesis or dissertation, must enroll for a minimum of three credits, until the degree is completed. If the student does not comply, his candidacy may be suspended and his supervisory committee dissolved. (3F, 3W, 3Sp, 3Su.) **Staff**

Department of

Psychology

(Psychology and Counseling)

ACTING HEAD: HEBER C. SHARP, Professor; PhD, University of Utah

OFFICE: Education 300

ARDEN FRANSDEN, Professor; PhD, University of Minnesota

DAVID R. STONE, Professor; PhD, University of Chicago

E. WAYNE WRIGHT, Professor; EdD, University of California

GLENDON CASTO, Associate Professor; PhD, University of Utah

MARVIN DALEY, Associate Professor; PhD, University of Houston

JOHN CRAGUN, Assistant Professor; PhD, Purdue University

KEITH CHECKETTS, Assistant Professor; PhD, University of Minnesota

RONALD S. PETERSON, Assistant Professor; EdD, University of Oregon

Master of Science Degree in Psychology. The Department of Psychology offers the Master of Science degree in nine areas: (1) general experimental, (2) developmental, (3) educational, (4) school psychologist, (5) counseling, (6) animal behavior, (7) physiological psychology, (8) social psychology, and (9) learning and motivation. In addition to these nine areas of psychology, a course of study leading to the Master of Science or Master of Education degree in counseling and guidance is outlined below.

Committee approval for entrance into MS programs in Psychology is based upon appraisal of (1) the student's undergraduate transcript, including 45 credits in psychology courses (general, experimental, developmental, physiological, sensory basis of behavior, social, abnormal, learning, statistics, psychometrics, and either counseling, educational or industrial); (2) scores on the Departmental Comprehensive Test in Psychology, and (3) scores on the Graduate Record Examination or Miller Analog Test.

The following core of courses is required in each area; 171 (ad-

vanced experimental analysis of behavior). Education 267 (research methods), 212 (statistics), 215 (seminar), 280 (personality), 191 (history and systems), and 217 (thesis, 9 credits). In addition to this core, courses totaling a minimum of 45 credits are recommended in the respective areas of specialization:

(1) *Experimental*: 170 Perception and Thought, 174 Sensory Basis of Behavior, 175 Physiological Psychology, 271 Seminar in Conditioning Techniques, 274 Advanced Sensory Basis of Behavior, 275 Advanced Physiological Psychology, 276 Comparative.

(2) *Developmental*: 123 Exceptional Children, 172 Motivation, 200 Principles of Learning, 202 Adolescent Psychology, 205 Child Psychology, 221 Individual Differences, 224 Mentally Retarded, 225 Gifted, 235 Play Therapy, 238 Practicum in Play Therapy.

(3) *Educational*: 123 Exceptional, 172 Motivation, 200 Principles of Learning, 221 Individual Differences, 224 Mentally Retarded, 225 Gifted, 227 Theories of Learning,

235 Play Therapy, 238 Practicum in Play Therapy.

(4) *School Psychologist*: 123 Exceptional Children, 172 Motivation, 200 Principles of Learning, 221 Individual Differences, 224 Mentally Retarded, 225 Gifted, 235 Play Therapy, 238 Practicum in Play Therapy, 282 Individual Testing, 283 Counseling, 284 Theories of Counseling, 285 Projective Methods, 286 Group Counseling, 287 Occupational Information, 288 Practicum in Counseling, 289 Practicum in Testing; Spec Ed 186 Diagnosis of Learning Difficulties, Spec Ed 288 Counseling of Parents of Exceptional Children.

(5) *Counseling*: 172 Motivation, 200 Principles of Learning, 224 Retarded Children, 225 Gifted Children, 282 Individual Testing, 283 Counseling, 284 Counseling Theories, 286 Group Counseling, 287 Occupational Information, 288 Practicum in Counseling, 289 Practicum in Testing, 290 Field Practice in Counseling and Guidance.

(6) *Animal Behavior*: 174 Sensory Basis of Behavior, 175 Physiological Psychology, 271 Seminar in Conditioning Techniques, 274 Advanced Sensory Basis of Behavior, 275 Advanced Physiological Psychology, 276 Comparative Psychology.

(7) *Physiological Psychology*: 174 Sensory Basis of Behavior, 175 Physiological Psychology, 271 Seminar in Conditioning Techniques, 274 Advanced Sensory Basis of Behavior, 275 Advanced Physiological Psychology, 276 Comparative Psychology.

(8) *Social Psychology*: 170 Perception, 180 Motivation, 261 Advanced Social Psychology, 262 Social Psychology of Teaching, 264 Experimental Social Psychology, 265 Culture and Personality.

(9) *Learning and Motivation*: 170 Perception, 174 Sensory Basis of Behavior, 175 Physiological Psychology, 180 Motivation, 200 Psychology of Learning and Teaching, 227 Theories of Learning, 271 Seminar in Conditioning Techniques.

Modifications: The courses of study outlined above are recommended as guides to both the student and his committee. However, each student—with the approval of his graduate committee—will find it possible to make minor adaptations of the outlines to meet his special interests and needs.

Master's Degree in Counseling. Three types of degrees are presently available: (1) A Master of Science degree in Psychology, with a major emphasis in counseling, (2) A Master of Science degree in Counseling Psychology, and (3) A Master of Education in Counseling and Guidance. The essential difference in these three tracks is in the amount of undergraduate course work in psychology. Essentially, the MS in Psychology requires a bachelor's degree, or 45-quarter hours of undergraduate psychology; the MS in Counseling Psychology requires only 30 hours of undergraduate psychology, with the remainder of undergraduate prerequisites allowable in education and/or other disciplines; and the MEd in Counseling and Guidance requires a teacher's certificate and not less than 17-quarter hours of undergraduate psychology, with the remainder of undergraduate prerequisites being allowed in education and/or other disciplines. Students entering graduate training in counseling are advised into the particular program track which seems most appropriate in terms of their previous training, as well as their present and anticipated interests for a greater emphasis either in

educational counseling and guidance, or in psychological counseling and school psychology. Outlines of the specific prerequisite requirements and the Master's degree requirements may be procured from the Psychology Department, Division of Counselor Education.

Master of Science Degree in Psychology-Speech Pathology. The Department of Audiology-Speech Pathology in cooperation with the Department of Psychology offers a composite Master of Science degree in Psychology-Speech Pathology. The course of study includes courses jointly approved by the two departments.

Certification as a School Counselor. Institutional endorsement for counseling certification is given to qualified applicants who successfully complete either the Master's degree program or in lieu of the Master's degree, the minimum number of graduate hours and specified course areas required by the State for the Professional Counselor's certificate. All applicants seeking Institutional endorsement for certification are expected to meet the general qualifications for admission to graduate school. Even though the applicant is a nondegree candidate, he must apply and be accepted into the graduate school as such in order to pursue institutional endorsement for either the Basic Professional or Professional Certificate. Course outlines relative to counselor certification may be procured from the Psychology Department, Division of Counselor Education.

Doctorate in Educational Psychology. The Department of Psychology in cooperation with the Departments of education, has planned a program of advanced graduate study in counseling, school psychology and educational psychology that

leads to the EdD degree in Educational Psychology.

The program requires a minimum of two years of graduate study, beyond the MS degree, including supervision of individual study, and an internship in schools, mental hygiene clinic, or social agency.

PhD Programs in Psychology. The Department offers PhD programs with specialization in the following areas:

- 1) Animal Behavior
- 2) Child and Developmental Psychology.
- 3) Learning and Motivation
- 4) Physiological Psychology
- 5) Social Psychology

For a description of the programs contact the Department Head or the Dean of Graduate School.

Committee approval for entrance into any one of the doctorate programs is based upon appraisal of (1) the student's undergraduate transcript; with a minimum of 40 quarter hours credit in areas of general psychology; (2) scores on the Departmental Comprehensive Test in Psychology, and (3) scores on the Graduate Record Examination.

Psychology Courses

GRADUATE AND UNDERGRADUATE COURSES

100. Human Growth and Development. A study of the developmental characteristics and process of human physical and psychological development from birth to maturity. Prerequisite: Psy. 53. (3F, W, Sp, Su) Staff

106. Educational Psychology. A study of the principles of learning in teaching and of the abilities and other relevant characteristics of children and adolescents on the basis of which elementary and secondary teachers can evaluate and/or develop conditions of effective learning. Prerequisite: Psy. 53. (3F, W, Sp, Su) Frandsen, Stone

112. Application of Statistics to Education and Psychology. Elementary study of statistical procedures in handling test scores and other data, and of the concept needed to read

current educational and psychological literature. (3F, W, Sp, Su)

Checketts, Sharp, R. Publicover

123. Psychology of Exceptional Children. The development and behavior characteristics of exceptional children. The education, home management, social control, and psychological treatment suited to their needs. Groups included are the mentally deficient, physically handicapped, the exceptionally gifted, and children having serious personality and conduct problems. (3F, W, Sp, Su)

Berg, Owens, Halstrom, Publicover

127. Psychology of Learning. A comprehensive study of descriptions and explanations of learning. Prerequisites: Psy. 53 and 71. (3F, Sp, Su)

Daley

128. Thinking and Verbal Behavior. Stresses mediational processes in thinking, cognition, concept learning, transfer, and hypothesizing as elements of complex learning and problem solving.

Stone

140. Abnormal Psychology. A descriptive and explanatory study of the varieties of mental abnormality—psychoses, psychoneuroses, and minor maladjustments—their causes, the methods of treatment, and the mental hygiene approach in preventing psychological maladjustments. Prerequisite: Psy 53 and 100. (3F, Sp, Su)

Sharp

145. Mental Hygiene. For teachers and other workers in social occupations. Designed to promote understanding of emotional and social adjustments, and as a basis for guiding children, adolescents and adults toward improved mental health. Prerequisite: Psy. 53 and 100. (3W)

R. Publicover, Sharp

155. Psychology of Business and Industry. The methods and principles of psychology are applied to several general problems in business and industry, including advertising and selling, selection and placement of employees, motivation and morale, training, conditions of work, and productivity. Prerequisite: Psy. 53. (3W)

Cragun

156. Problems in Industrial Psychology. An analysis of current issues, problems, methodologies, and research in Industrial and Business Psychology. Prerequisites: Psy. 112 (or equivalent) and 155.

Cragun

161. Social Psychology. A study of behavior in the framework of social influences, including communication, social interaction, social norms, roles, leadership, influence of culture and social structure on personality, social attitudes, attitude change and propaganda. Prerequisites: Psy. 53 and 100. (3F, Sp, Su)

Staff

170. Perception. The development, structure, role in behavior, and factors affecting perceptual processes: a study of the theories and experiments. (3F) **Staff**

171. Advanced Experimental Analysis of Behavior. The course will emphasize methods and procedures which enable psychologists to manipulate behavior. Current research methods will be emphasized and demonstrated. Non-statistical analysis of behavior will be emphasized. Prerequisite: Psy. 71 or equivalent. (3W) **Daley**

172. Motivation. An introduction into and examination of pertinent theories of motivation with special emphasis on the role of motivational factors in human behavior and learning. (3W, Su) **Casto, Sharp**

174. Sensory Basis of Behavior. An introductory course into the sensory basis of behavior to include study and experimentation on psychophysical methods, anatomy of receptors, physiology of receptors and central nervous system basis of sensation. Prerequisites: Psy. 53, and Phys. 4, Human Physiology. (3W) **Staff**

175. Physiological Psychology. Physiological mechanisms underlying behavior. Prerequisites: Psy. 53 and Phys. 4, Human Physiology. (3Sp, Su) **Staff**

181. Psychometrics Applied to Guidance. The evaluation, interpretation, and uses of tests of intelligence, aptitudes, interests, personality, and adjustment. Prerequisite: Psy. 53 and 112. (5F, Su) **Frandsen**

191. History and Systems of Psychology. History of psychology and a critical comparison of the several systematic points of view on major problems in psychology. (3Sp) **Sharp**

GRADUATE COURSES

200. Principles of Learning in Teaching. A study of learning theory and of experiments in psychology and education for the purpose of developing a set of learning principles as a guide to creating conditions for effective learning in both elementary and secondary schools. Prerequisites: Psy. 53, 112, and 106. (3W, Su) **Stone**

202. Psychology of Adolescence. Growth, psychological and social characteristics, development, educational and guidance needs and adjustment problems of adolescents as met in schools, homes and communities. Prerequisites: Psy. 53 and 100. (3Sp, Su) **Staff**

205. Child Psychology and Development. The roles of maturation, learning, and environmental conditions in the motor, mental, social, emotional and personality development in children from birth to adolescence. Prerequisites: Psy. 53 and 100. (3F, Su) **Casto**

212. Advanced Applications of Statistics to Education and Psychology. This course covers analysis of variance and covariance, varied correlation techniques, partial and multiple correlation, and non-parametric methods. Prerequisite: Psy. 112. (3Sp, Su) **Staff**

214. Independent Readings in Psychology. For students who cannot participate in the discussion in Psychology 215, this course provides opportunity for independent readings and conferences on topics individually selected. Prerequisite: prior course in the area of the topic selected. (2F, W, Sp, Su) **Staff**

215. Seminar Discussion of Current and Special Topics in Psychology. Weekly discussions of topics in current magazines plus independent reading either of some especially significant book or periodical literature on a specialized topic, selected according to student's interest. May be taken 1, 2 or 3 quarters. (2F, W, Sp, Su) **Staff**

217. Research for Master's Thesis in Psychology. Credit arranged. (F, W, Sp, Su) **Staff**

224. Characteristics of the Mentally Retarded. A study of the characteristics, identification, and treatment of the mentally retarded. Emphasis upon the psychological, social, and educational problems in the treatment and control of the mentally handicapped. (3Sp, Su) **Owens, Halstrom**

225. Characteristics and Education of the Gifted Child. A study of the characteristics, means of identifying, guidance, and education of gifted children. (3W, Su) **Halstrom**

227. Theories of Learning. An integration and synthesis of the literature. A comparison and evaluation of alternate operational and theoretical explanations of learning. (3F) **Stone**

235. Observation and Case Analysis in Play Therapy. Exploration of theories and potentialities of specialized play therapy experience. Concepts and principles in the inter-personal process are examined and developed. (3F, Su) **Staff**

238. Practicum in Play Therapy. Direct experience with children in the play therapy situation. Prerequisite: Psy. 235. (2F, W, Sp, Su) **Casto**

261. Advanced Social Psychology. Experimental and theoretical studies of selected current topics in social Psychology—including group behavior, motivation, reactions to frustration and conflict, attitude measurement, personality development, and cultural aspects of behavior. Prerequisites: Psy. 112 and 161. (3W) **Staff**

262. Social Psychology of Teaching. Applications of the principles of social psychology in

teaching including study of social structures and dynamics of instructional groups; roles of teacher and students; formation and effects of group norms; and of factors affecting group learning and problem solving, discipline, and self and social development. Prerequisites: Psy. 112 and 161. (3Sp, Su) **Cragun**

263. Attitudes and Attitude Measurement. A study of basic issues in the study of attitudes, including measurement, structuring, and such current issues as primacy-recency effects, immunization, etc. Prerequisites: Psy. 261 and 212. **Staff**

264. Experimental Social Psychology. A review and critique of the experimental literature in certain selected areas of social psychology. Students will be required to prepare and carry out an experiment in one of these areas. Prerequisites: Psy. 261 and 212. (3W) **Staff**

265. Culture and Personality. A study of the relationship between various cultural systems and their effect on personality. Various theoretical orientations will be reviewed including psychoanalytic theory, general behaviorism and field theory. Prerequisite: Psy. 261. (3Sp) **Staff**

266. Small Group Analysis. An analysis of small groups, including: problems of measurement, theories of interaction, role behavior, norms, group size, leadership, normative behavior, etc. Prerequisites: Psy. 261 and 212. **Staff**

267. Research in Psychology on Education. See Educ. Adm. 267. (3F, Sp, Su) **Checketts, Shaver**

271. Seminar in Conditioning Techniques. The course will emphasize current research in respondent and operant conditioning. The student will be responsible for an independent survey of the literature or an independent experimental demonstration. (3W) **Daley**

274. Advanced Sensory Basis of Behavior. An advanced course in sensation concentrating on the physiological basis of sensation. This course is designed for the graduate student in physiological psychology. It is a survey of current research in both the cellular and gross physiological basis of sensation. Prerequisite: Psy. 174. (3W) **Staff**

275. Advanced Physiological Psychology. Neuroanatomy and neurophysiological basis of behavior. A survey of brain and behavior from the cellular level on up. Current research in neuropsychology will be emphasized. Prerequisite: Psy 174 and 175. (3Sp) **Staff**

276. Comparative Psychology. A phylogenetic study of animal behavior. Comparing naturalistic and experimental findings. (3W) **Daley**

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- 280. Personality.** An advanced study of the organization, development, dynamics and appraisal of personality. Theories and empirical investigations of personality are studied as a basis for arriving at integrated concepts of the nature and development of personality. (3Sp, Su) **Sharp**
- 282. Individual Diagnostic Intelligence Testing.** Techniques of individual testing, including intensive practice in the administration and interpretation of (a) the Stanford-Binet and Wechsler's intelligence scale for children, in the examination of school-age children, and (b) Wechsler's adult intelligence scale for use with adolescents and adults. Prerequisite: Psy. 181. (3W, Su) **Casto**
- 283. Principles and Techniques of Counseling.** Principles and techniques of counsel-students on problems of curriculum planning and vocational choice, on improving methods of study, and emotional and social adjustment. Prerequisites: Psy. 53, 106 and Ed. 128. (3F, Su) **Bertoch, Wright**
- 284. Theories of Counseling.** An advanced study of the theories of counseling, to develop greater understanding of and a more effective approach to counseling. Prerequisite: Psy. 283. (3W, Su) **Wright**
- 285. Introduction to Protective Methods of the Study of Personality.** The dynamics of human adjustment and the common projective methods for revealing motives, attitudes, and adjustment mechanisms of children and adults. Prerequisite: Psy. 181. (3Sp, Su) **Frandsen, Casto**
- 286. Group Procedures in Counseling and Guidance.** The intent of this course is to acquaint the student with current theory and practice in the use of groups for various educational and psychological processes and to effect some initial skills in working particularly with guidance, counseling, and/or therapy groups. Prerequisite: Psy. 181, 283. (3W, Su) **Wright**
- 287. Occupational Information.** Collection, classification, and uses of occupational information in counseling. (3W) **Bertoch**
- 288. Practicum in Counseling.** Supervised practice in counseling in elementary or secondary schools in the University or in clinical or guidance agencies. Prerequisites: Psy. 181, 284, and consent of the Director of Counselor Education one-quarter prior to registration. (2F, W, Sp, Su) **Wright, Peterson, Bertoch**
- 289. Practicum in Psychological Testing.** Supervised practice in psychological testing in elementary or secondary schools, in the university, or in clinical or guidance agencies. Prerequisite: Psy. 282. (2Sp) **Frandsen, Casto**
- 290. Field Practice in Counseling and Guidance.** A one-quarter internship for prospective counselors in approved school systems or other agencies of Utah and Idaho. In some settings the trainee may receive a stipend for full-time work. The intern will be placed in a field setting appropriate to his anticipated employment goals, and will be supervised by a qualified person in the field setting and by the counselor education staff of the University. Prerequisites: consent of the Director of Counselor Education. (6F, W, Sp) **Wright**
- 297. Workshop in Guidance.** A faculty or part of a faculty in a school or school district studies, evaluates, and attempts to improve the use of the school's resources for more effective guidance in its several phases. (3F, W, Sp) **Staff**
- 298. Techniques of Programming.** Analysis of program efficiency based on a study of curricular sequence. Review of research and laboratory work on styles of program construction. (3Su) **Stone**
- 300. Psychological Foundations of Education.** From a study of the psychological educational theories and supporting experiments—on motivation, learning, abilities, interests, personality, inter-personal relations, teaching and evaluation—students will formulate an integrated theory of teaching. (3W) **Frandsen**
- 305. Advanced Child Psychology.** A critical and creative approach to the study of the nature and factors affecting child development, including the consideration of theories, experiments, and proposed new studies in the field. (3W) **Frandsen**
- 310. Educational Diagnosis of Learning Difficulties.** Principles from educational psychology applied to the diagnostic study of the difficulties students have in learning reading and other subjects. (3F, Su) **Stone**
- 314. Advanced Independent Study in Psychology.** Credit Arranged. (F, W, Sp) **Staff**
- 315. Doctoral Colloquium.** A colloquium on advanced theories and research in Psychology. Required of all PhD and EdD candidates. (3Sp) **Staff**
- 317. Research for the Doctorate Thesis in Psychology.** (F, W, Sp) **Staff**
- 323. Advanced Exceptional Child.** A critical and creative approach to the study of the characteristics, education, and guidance of exceptional children. (3F) **Owens**

381. Advanced Psychometrics. The basic principles of psychometrics as applied in the construction, evaluation, interpretation, and uses of tests of abilities, achievements, interests and personality. (3W) **Frandsen**

386. Problems in Counseling. Individual case studies of children and adolescents presenting problems of diagnosis, guidance, remedial teaching and psychotherapy. (3F) **Wright**

387. Clinical Internship. A clinical internship for doctoral candidates in which advanced testing, diagnosis, and the writing of psychological protocols is practiced in mental hospitals, mental health clinics and child guidance centers. Administration and interpretation of mental tests, projective tests and aptitude tests will be supervised by clinical psychologists in the center and by departmental staff. Finan-

cial support by the center for selected candidates will be available. Approved centers: Cache County Mental Health Clinic, Utah State Industrial School, Ogden, and Wyoming State Mental Hospital, Evanston, Wyoming. (3-6F, W, Sp, Su) **Sharp, Casto**

388. Internship in School Psychology. Supervised practice in providing psychological services in a school setting. (3F, W, Sp) **Staff**

400. Continuing Graduate Advisement. Graduate students who have received maximum thesis credit, but who have not completed the thesis or dissertation, must enroll for a minimum of three credits, until the degree is completed. If the student does not comply, his candidacy may be suspended and his supervisory committee dissolved. (3F, 3W, 3Sp, 3Su.) **Staff**

Department of

Secondary Education

HEAD: KENNETH CHARLES FARRER, Associate Professor; EdD, University of Utah

OFFICE: Education 104

JOHN C. CARLISLE, Professor and Emeritus Dean, College of Education; EdD, University of California

ELDON M. DRAKE, Professor; PhD, Iowa State University

ROSS R. ALLEN, Associate Professor; EdD, University of Utah

PEARL S. BUDGE, Emeritus Associate Professor; MS, Utah State University

JOHN HAAS, Associate Professor; PhD, University of Michigan

THEODORE W. IVARIE, JR., Assistant Professor; EdD, Arizona State University

SAMUEL P. McEVOY, Assistant Professor; EdD, Colorado State College

H. DALE RASMUSSEN, Assistant Professor; MS, Utah State University

WALTER L. SAUNDERS, Assistant Professor; MS, and doctoral work, Oregon State University

Master's Degree. The Department of Secondary Education offers programs leading to the degrees: Master of Education, Master of Science, and Master of Arts. These degrees are designed to provide training for those preparing to become master teachers, supervisors, and curriculum specialists. Each program provides for a core of courses in education

and psychology and advanced training in the candidate's field. Candidates should matriculate in the Department of Secondary Education.

Approved majors for the Master's degree in Secondary Education include: Secondary School Administration, Secondary School Teaching, Art Education, Drama Education, Music Education, Speech Education,

Biological Science Education, General Science Education, Physical Science Education and Social Studies Education.

Doctor of Education Degree. The Department of Secondary Education, in cooperation with the Department of Elementary Education, and the Department of Special Education offers the Doctor of Education degree in curriculum development and supervision. This degree is designed for those planning to be curriculum coordinators or supervisors in school districts and college teachers. Candidates may matriculate in the Department of Secondary Education or in the Department of Elementary Education.

Secondary Education Courses

GRADUATE AND UNDERGRADUATE COURSES

146. Laboratory Practicum for Secondary Science Teachers. Lecture and laboratory experience provides initiation into investigative laboratory techniques and procedures appropriate for the new high school science curricula. (3W, Su) **Saunders**

147. Improvement of Reading in Secondary Schools. A study of research and classroom practices is designed to assist secondary school pupils with low reading abilities. For English teachers and those wishing to qualify for remedial reading certificates. (3W, Su) **Budge**

161. Audiovisual Education. Studies the building of a program in which the newest materials and techniques are utilized. Preparation of audiovisual material. (3F, W, Sp, Su) **Drake, Beutler**

162. Audiovisual Techniques. An advanced course designed to prepare students in the operation, care and maintenance of Audiovisual equipment. The construction and proper utilization of teaching aids in the classroom will also be emphasized. (3Su) **Drake**

163. New Media in Education. The development, organization, and use of such new media as television, teaching machines, programmed learning in the public schools. Ways and means of organizing for team teaching will be considered. (3F, W, Sp, Su)

Beutler, Drake

164. Measurements and Evaluations in Education. Evaluates procedures in education including principles of measurements, tests, and text construction. The development of more valid and objective teacher made tests will be studied. (3F, W, Sp, Su) **Staff**

186. Diagnosis and Treatment of Learning Difficulties. See Special Education 186. (3F, Sp, Su) **Stone**

GRADUATE COURSES

230. Secondary School Curriculum. A study of the secondary school curriculum, junior and senior high school, as it now exists in typical schools, together with proposals for improvement. (3F, Su) **Allen, Farrer, McEvoy**

232. Aerospace Education. See I. Education 232. (3Su) **Summers**

233. The Junior High School. Formerly 217. A study of the junior high school as it has developed as a distinct segment of the American Public School system, its functions, organization and curriculum, together with recommendations for improvement. (3Su) **Staff**

237. Seminar in Secondary Education. For graduate students in secondary education and those preparing for school administration or supervision in junior or senior high school. Reviews current research in areas of interest to class members. (2Sp, Su) **Allen, Farrer**

240. Improvement of English in the Junior and Senior High School. An advanced course for experienced teachers. Evaluates significant changes in content and methods as revealed by formal research and successful practice. (3Su, W) **Budge**

241. The Improvement of Social Studies in the Secondary School. For experienced teachers. Deals with newer concepts in curriculum and methods of instruction in social studies in the secondary school. (3F, Su) **Haas**

242. The Improvement of Science in the Secondary School. For experienced teachers. Deals with newer concepts in curriculum and methods of instruction in physical and biological sciences in the secondary school. (3Sp, Su) **Saunders**

243. The Improvement of Mathematics in the Secondary School. For experienced teachers. Deals with newer concepts in curriculum and methods of instruction in mathematics in the secondary school. (3W, Su) **Allen**

256. Social Studies Curriculum. Recurring philosophical problems in social studies education, their relationship to curriculum choices in a democracy, and problems of content selection and methodology in the light of desired objectives. Prerequisite: Ed 134, (3F, W, Sp) **Haas**

258. Practicum in the Evaluation and Improvement of Instruction. Designed as an in-service training course for experienced teachers and administrators. Emphasis is given to evaluating and improving the educational program in a particular school or school district as a result of an assessment of the needs of the community and instructional procedures and teaching methodology. (3F, W, Sp, Su)

Staff

259. Supervising Student Teaching. Considers ways and means of providing desirable experiences for student teachers in the public schools. The role of the classroom teacher and the college supervisor will be analyzed. (3F, Su)

Staff

264. Instructional Leadership in Education. Principles and practices of school supervision, including qualifications and responsibilities of supervisors of instruction in public education. The role of the principal, the curriculum director and other administrators in instructional leadership will be considered. (3W, Su)

Allen, Farrer, McEvoy

266. Introduction to Research in Education. See Educ Adm 266. (3F, Su)

Carlisle

267. Research in Psychology and Education. See Educ Adm 267. (3F, Su)

Shaver

283. Reading and Conference. Provides for individually directed study in subjects of special interest and preparation. Credit arranged. (F, W, Sp, Su)

Staff

285. Research and Thesis Writing. Formerly 271. Individual work in thesis writing with guidance and criticism. Credit arranged. (F, W, Sp, Su)

Staff

364. Theories of Teaching. The purpose of this seminar is to understand and formulate the structure of the teaching acts as each relates to the formal and informal processes of education. It emphasizes that the chief function of theory is to provide a framework for observation and analysis. Students will examine theoretical positions which survey the significant domains of teacher performance such as motivating-reinforcing; presenting-explaining-demonstrating; organizing-planning-managing; evaluating; and counseling-advising. (3Sp, Su)

Allred, Farrer

365. Curriculum Development. Formerly 315. Advanced problems in curriculum building. Philosophic bases of the curriculum, current practices, and organization for curriculum study. (3Sp, Su)

Allred, Farrer, Haas

366. Internship in School Supervision. Provides extensive experience for the advanced student working on the Doctor of Education Degree in Curriculum Development and Supervision. The student works a minimum of one quarter full time under the direction of an administrator, in a public school or University. Credit arranged. (F, W, Sp)

Staff

385. Field Studies and Thesis. Formerly 375. Individual work on research problems in the EdD program. Credit arranged. (F, W, Sp, Su)

Staff

400. Continuing Graduate Advisement. Graduate students who have received maximum thesis credit, but who have not completed the thesis or dissertation, must enroll for a minimum of three credits, until the degree is completed. If the student does not comply, his candidacy may be suspended and his supervisory committee dissolved. (3F, 3W, 3Sp, 3Su.)

Staff

Department of

Special Education

ACTING HEAD: KAYE DON OWENS, Associate Professor; EdD, Colorado State College

OFFICE: Education 413

FREDERICK S. BERG, Associate Professor; PhD, Southern Illinois University

FRANCES J. HALSTROM, Associate Professor; EdD, Colorado State College

PHYLLIS PUBLICOVER, Assistant Professor; MS, Utah State University

ROBERT PUBLICOVER, Assistant Professor; MS, Utah State University

DEVÖE RICKERT, Assistant Professor, EdD University of Oregon

GORDON BELNAP, Instructor; MS, Utah State University

MARNELL JACOBS, Instructor; MS, University of Florida

BETTY JANIAC, Instructor; MS, Utah State University

KENNETH MORGAN, Instructor; MS, Utah State University

The Department of Special Education offers programs leading to Master of Science or Master of Education degrees in seven areas: (1) Mental Retardation, (2) Emotional Disturbance, (3) Remedial Reading, (4) Cultural Disadvantage, (5) American Indian Education, (6) Gifted, and (7) Educational Audiology (in cooperation with the Department of Audiology-Speech Pathology). Special certification may be obtained in teaching mentally retarded, remedial reading, and hard of hearing. Certification standards for teaching the emotionally disturbed are pending administrative action, but the department's program will meet the requirements when they are published. A minimum of six hours credit in field experience or practice teaching with exceptional children is required for certification.

Programs of study are as follows:

Graduate Nondegree Program with Professional Certificate to Teach Mentally Retarded. Below are listed requirements for a student who wants to obtain a Professional Certificate (Utah) to teach mentally retarded children or youth, but does not want a master's degree.

Prerequisites

1. Bachelor's degree
2. Elementary, Secondary, or Special Teaching Certificate
3. Three or more years of attested successful teaching
4. Basic Professional Certificate, or eligibility to be awarded this certificate. To be eligible for this certificate, one must have successfully passed the following courses or their equivalent.

Psych 123	Psychology of Exceptional Children	3
Psych 100	Human Growth and Development	3
Sp Ed 124	Characteristics of the Retarded	3
Sp Ed 184	Curriculum for the Trainable Retarded	3

or

Sp Ed 187	Curriculum for Educable Retarded	
Sp Ed 186	Diagnosis and Treatment of Learning Difficulties	3
Sp Ed 185	Arts and Crafts for the Mentally Retarded	3
or		
Ph Ed 126	PE for Teachers of Mentally Retarded	
Sp Ed 195	Community Relations	3
Sp Ed 191	Student Teaching	6

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Having met the above prerequisites, the student is ready to pursue the course of study leading to Professional Certification. This program consists of the following:

Sp Ed 288	Counseling and Guidance for Parents	3
Sp Ed 289	Diagnosis of the Mentally Retarded	3
Sp Ed 298	Vocational Rehabilitation for the MR	3
Sp Ed 294M	Seminar: Mental Retardation.....	3
Sp Ed 293	Education of the Socially Maladjusted Ad	3
Sp Ed 287	Basic Problems of Teaching the MR	3

Select 12 hours from this total18

Master of Education in Special Education (with Professional Certification in Mental Retardation). This program is designed to satisfy the requirements for a master's degree in education and the requirements for a Professional Certificate in Special Education (MR). Undergraduate prerequisites will be examined and deficiencies determined by the advisor.

Basic Required Courses

Ed Ad 266	Introduction to Research in Education	3
Sp Ed 285	Research and Thesis (seminar reports)	3
Sp Ed 124	Characteristics of the Mentally Retarded	3
Sp Ed 184	Curriculum for Trainable Retarded	3
or		
Sp Ed 187	Curriculum for Educable Retarded	
Sp Ed 186	Diagnosis of Learning Diff.	3
Sp Ed 185	Arts and Crafts for the Mentally Retarded	3

or

Ph Ed 126	PE for Teachers of Retarded	3
Sp Ed 195	Community Relations	6
Sp Ed 191	Student Teaching	3
Psych 100	Human Growth and Develop.	3
Psych 123	Psych of Exceptional Chil.	3
		33

The candidate must choose, in consultation with his graduate committee, twelve hours from the following:

Sp Ed 288	Counseling of Parents	3
Sp Ed 289	Diagnosis of Mental Retardation	3
Sp Ed 294M	Seminar: Mental Retardation	3
Sp Ed 298	Vocational Programs for the Retarded	3
Sp Ed 293	Education of the Socially Maladjusted Ad.	3
Sp Ed 287	Basic Problems in Teaching the MR	3

In addition to the above, the candidate must select at least three hours to meet the requirement of a total of 48 credit hours for the ME degree. Also, if he has not had some of the basic required courses as an undergraduate, he must choose courses so that he has a total of 25 hours at the 200 level. For those who have satisfied some of the requirements listed under "basic required courses," advanced courses must be chosen to make up a total of at least 48 hours.

Candidates for this degree who have not had their undergraduate work in special education should expect to spend more than three quarters completing the requirements.

Master of Science in Special Education (with Professional Certification to Teach the Mentally Retarded). This program is identical with the program outlined above, except that the candidate must take Ed Ad 267 instead of 266 and Sp Ed 285 for three to nine credits thesis. The candidate is expected to do his thesis in the area of concentration.

Master of Science in Special Education (without Utah Certification). This course of study is for students who plan to meet the requirements to teach mentally retarded in states other than Utah, or plan to deal with mentally retarded persons in educational settings or service areas other than the public school classroom. Twenty-four credit hours must be in the field of mental retardation, and the general requirements for an MS degree must be met. It is the responsibility of the student, in conference with his graduate committee and with their approval, to select a program which will meet requirements.

Master of Education in Special Education (with Basic Professional Certification). This plan is for those students who desire a Master of Education degree and a Utah Basic Professional Certificate (as against a Professional Certificate), with emphasis in another approved (not special education) field.

Students should note that, in Utah, the Basic Certificate is issued for a five year period. Nine hours of additional approved work are needed for its renewal for another five years.

The requirements for this course of study are identical with the basic required courses for the Master of Education with professional certification, plus selected courses in the area of interest. A total of 48 committee-approved hours, 25 of them at the 200 level, is the minimum.

Master of Education (or Science) in Special Education with Emphasis on Learning and Adjustment Disorders. There are three degree offerings in this area of specialization: (1) Master of Science (MS) with professional certification, (2)

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Master of Science, without professional certification, (3) Master of Education (MED) with professional certification.

A teaching certificate (elementary or secondary) is prerequisite to a program for professional certification.

Core of Required Courses for Either MS or MED Programs

Psych 123	Psychology of Exceptional Children	3
Sp Ed 186	Diagnosis and Treatment of Learning Difficulties	3
Sp Ed 193	Psychopathology of Children	3
Sp Ed 291	Identification of Emotionally Disturbed	3
Sp Ed 292	Education of the Emotionally Disturbed	3
or		
Sp Ed 293	Education of the Socially Maladjusted	3
Sp Ed 192	Field Experience with Exceptional Child	*3

Master of Education with Professional Certificate

Prerequisite: Elementary or Secondary Certificate		
The required courses listed above, plus:		
Sp Ed 285	Research and Thesis —seminar report	3
Ed Ad 266	Introduction to Research in Education	3
Sp Ed 191	Student Teaching in ED	3-6
Approved electives to complete requirements		

Master of Science with Professional Certificate

Prerequisite: Elementary or Secondary Certificate		
The required courses listed above, plus:		
Sp Ed 285	Research and Thesis	3-9
Ed Ad 267	Introduction to Educational Research	3
Psych 181	Psychometrics Applied to Guidance	5
Sp Ed 191	Student Teaching	3-6
Approved electives to complete requirements		

Master of Science without Professional Certification

Programs under this option are individually planned to meet the needs of those who plan to teach children with learning and adjustment disorders in states other than Utah, or plan to deal with such children in educational settings or service areas other than the public schools.

Master of Education in Special Education (Compensatory Educa-

tion). This course of study is designed to meet the needs of teachers of children and youth whose learning difficulties are attributed to the cultural differences and deprivations which are prevalent among children from socially or economically disadvantaged environments.

At present, a separate teaching certificate for compensatory education is neither required nor offered in Utah or adjacent states. Students who elect this course should already have a teaching certificate.

Required courses should be taken in the sequence shown below. Student teaching may be waived for acceptable experience, but if required, the total program may take four quarters to complete. A candidate may return to his own school, to his regular job, for the student teaching, provided a substantial proportion of the pupils are judged to be culturally disadvantaged and the school is in this geographical area.

First Quarter

Anthrop 105	Comparative Value Systems and Education	3
or		
Anthrop 165	Culture and Personality	
Sp Ed 299	Language and Linguistics for the Teacher	3
Sp Ed 296	Problems and Methods in Compensatory Educ.	3
Sp Ed 285	Research and Thesis (seminar report)	1
Psych 123	Psychology of Exceptional Children	3

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Second Quarter

Sp Ed 294	Seminar: Comp. Education	3
Sp Ed 192	Field Experience: Compensatory Education	3
Sp Ed 195	Community Relations	3
Ed Ad 266	Introduction to Research in Education	3
Sp Ed 285	Research and Thesis (seminar report)	1
	Elective	3

*May be waived for acceptable experience

Third Quarter	
Sp Ed 285	Research and Thesis1
	Electives (at least 9 hours
	in 200 courses)16
	17
	46

Master of Education in Special Education (Indian Education). The course numbers of the program, and general requirements, are identical with the program in compensatory education, except that in all required courses special provisions are made for the problems of Indian education, and the field experiences are very different. Anthropology 268 may be substituted for Special Education 294C.

Teaching certificate is prerequisite. No special certificate is awarded. Others may enter the course, but it is designed for and oriented towards public school teaching.

Master of Education in Special Education (with Emphasis on Teaching the Gifted). A teaching certificate is prerequisite to entry into this program.

Required Courses	
Psych 123	Psychology of Exceptional Children3
Sp Ed 186	Diagnosis and Treatment of Learning Difficulties3
Sp Ed 191	Student Teaching6
Sp Ed 192	Field Experiences3
Sp Ed 286	Curriculum for the Gifted3
Sp Ed 290	Educating for Mental Health....3
Sp Ed 285	Research and Thesis (seminar report)3
Ed Ad 266	Introduction to Research in Education3
El Ed 220	Creative Teaching3
Psych 225	Characteristics of the Gifted....3
Sp Ed 295	Teaching Literature to the Gifted 3
	36
Plus at least 15 committee-approved graduate hours12	
Minimum total graduate hours.....48	

Master of Science in Special Education (with Emphasis on Teaching the Gifted). This option is the

same as that shown above except that Ed Ad 267 replaces Ed Ad 266 and a thesis of 3-9 credit hours must be written in the field of the gifted. Forty-five graduate hours, instead of 48, is the minimum total.

Note: There is no special teaching certificate or endorsement for teaching the gifted in Utah. Persons who wish to meet requirements for such certification in other states should plan their programs accordingly. The program offered here may be tailored to fit any state requirements.

Master of Science (with Emphasis on Teaching the Multiply Handicapped). A program is currently being developed in this area of Special Education.

Master of Education in Special Education (with Emphasis in Remedial Reading). Either an elementary or secondary teaching certificate is a prerequisite for this course of study. Also prerequisite are Ed 107, Reading in Elementary Schools and Eng. 122, Children's Literature.

Required Core of Courses	
Psych 123	Psych. of Exceptional Children 3
Sp Ed 186	Diagnosis and Treatment of Learning Difficulties3
Sp Ed 213	Remedial Reading Diagnosis3
Sp Ed 214	Remedial Reading Remediation....3
Sp Ed 216	Practicum in Remedial Reading3-6
Ed Ad 266	Introduction to Research in Education3
Sp Ed 285	Research and Thesis (seminar report)3
El Ed 225	Improvement of Reading3
	24-27
Electives approved by individual's graduate committee24-21	
Minimum total quarter credit hours48	

Master of Science in Special Education (with Emphasis on Remedial Reading). This course of study has the same basic requirements as that listed above, except that Ed

Ad 267 must be taken instead of Ed Ad 266, and a thesis instead of a seminar report must be written. Elementary statistics is a prerequisite to Ed Ad 267. Total committee-approved graduate hours are set at 45, as a minimum.

Present requirements for a Provisional Endorsement will be issued upon the recommendation of the university to a teacher in a remedial program who has completed a minimum of 10 quarter hours of approved specialized training. This endorsement is valid for two years and will be re-issued upon completion of 6 quarter hours of additional approved study, until the requirements for the Professional Endorsement are met.

A Professional Endorsement requires 16 quarter hours of approved specialized training. It is valid for five years and will be re-issued for another five year period after completion of 6 additional quarter hours of approved study.

Master of Science in Educational Audiology. This degree program is administered through the Department of Audiology-Speech Pathology. Upon completion of this program the student meets the requirements for the Certificate of Clinical Competence in Audiology of the American Speech and Hearing Association and for a Utah professional certificate for teaching of the partially hearing. Students who desire to meet the teacher certification requirements must also meet requirements for either an elementary or secondary teaching certificate.

The person who begins specialization as a graduate student will spend two years in the master degree program.

Required Courses

A-Sp	50	Fund. of Communication Science	5
A-Sp	70	Language, Hearing and Speech Development	3
A-Sp	90	Phonetics	3
A-Sp	110	Fund. Anatomy of Speech and Hearing	5
A-Sp	120	Speech Pathology I	5
A-Sp	125	Speech Pathology II	5
A-Sp	135b	Clinical Practicum-Audiology	Arr.
A-Sp	135c	Clinical Practicum-Educational Audiology	Arr.
A-Sp	150	Audiology I	5
A-Sp	155	Audiology II	3
A-Sp	160	Audiology III	3
A-Sp	170	Speech for the Hearing Impaired	3
A-Sp	172	Language for the Hearing Impaired I	3
A-Sp	174	Language for the Hearing Impaired II	3
A-Sp	176	Language for the Hearing Impaired III	3
A-Sp	178	The Young Hearing Impaired Child	3
A-Sp	180	Dactylogy	2
A-Sp	200	Seminar in Educational Audiology	Arr.
A-Sp	225	Diagnostic Methods in Speech Pathology	3
A-Sp	230	Medical Background in A-Sp Pathology	4
A-Sp	235a	Clinical Practicum, Speech Pathology	4
A-Sp	235b	Clinical Practicum, Audiology	Arr.
A-Sp	235c	Clinical Practicum, Educational Audiology	Arr.
A-Sp	240	Public School Clinical Practicum	Arr.
A-Sp	260	Pediatric Audiology	3
A-Sp	270	Speech Reading	3
A-Sp	275	Auditory Training	3
A-Sp	290	Research and Thesis	Arr.
El Ed	213	Diagnosis of Reading	3
El Ed	214	Remedial Reading Instruction	3
Psych	123	Psych of Exceptional Children	3
Psych	127	Psychology of Learning	3
or			
Psych	200	Principles of Learning	
Sp Ed	180	Education of the Hearing Impaired	3
Sp Ed	181	Characteristics of the Hearing Impaired	3
Sp Ed	288	Counseling Parents of Exceptional Children	3

Special Education Courses

GRADUATE AND UNDERGRADUATE COURSES

100. Fundamentals in Speech Disorders. See Speech 170. (5F) Siaff

112. **Application of Statistics to Education.** See Psychology 112. (3F, W, Sp, Su)
Frandsen, Sharp, R. Publicover

126. **Physical Education for the Mentally Retarded.** See Physical Education 126. (3F, W, Sp, Su)
Belnap

127. **Psychology of Learning.** See Psychology 127. (3F, W, Su)
Frandsen

155. **Utilization of Audiovisual Media.** See IMLS 155. (3F, W, Sp) Beutler, Essig, Smellie

156. **Instructional Media in Education.** See IMLS 156. (3W, Su)
Essig

165. **Production of Audiovisual Materials.** See IMLS 165. (3F, W, Sp, Su)
Smellie

166. **Local Production of Audiovisual Materials.** (3W, Su)
Smellie

171. **Programs for Recreational Therapy.** See Physical Education 171. (3W)
Burnett

180. **Education for Hearing Impaired I.** Academic evaluation, guidance and acceleration of the hearing impaired; systematic procedures for optimal development of reading, mathematical, social, and scientific academic skills; cooperation with regular school personnel. (3F, Su)
Berg

181. **Characteristics of the Hearing Impaired.** Evaluation techniques used in placement, education, and guidance of the hearing impaired; associated psychological, social, educational and vocational problems; special apparatus, devices, techniques and educational approaches; mental, emotional, symbolic, motor and visual problems. (3Sp, Su)
Berg

181. **Psychometrics.** See Psychology 181. (5F)
Frandsen

184. **Curriculum for the Mentally Retarded — (trainable).** A study of curricula and adaptations in methods specifically suited to the abilities of mentally retarded children. Provides helpful guidance both for teachers of special classes and public schools and teachers in community centers. Psychology 123 is a prerequisite or should be taken concurrently. (3F, Su)
Owens, Rickert

185. **Arts and Crafts for the Mentally Retarded.** A laboratory study of methods and procedures of arts and crafts in classroom and instruction for the mentally retarded. (3F, Sp, Su)
Owens, Laird

186. **Diagnosis and Treatment of Learning Difficulties.** A study of methods of dealing with learning difficulties in basic educational skills of pupils in the elementary and secondary schools. The emphasis is upon developmental and corrective measures in the typical classroom. (3F, Sp, Su)
Owens, Stone

187. **Curriculum for the Educable Mentally Handicapped.** A study of curricula and adaptations in methods of teaching especially suited to the needs and abilities of mentally retarded children. Provides helpful guidance both for teachers of classes for these children and for teachers who provide for them in regular school classes. Psy 123 is a prerequisite or should be taken concurrently. (3F, Su)

Owens, P. Publicover

191. **Student Teaching in Special Education.** Designed to help the teacher apply methods and techniques found to be successful with slow-learning children, emotionally disturbed children, and culturally disadvantaged. The apprentice plan is followed which requires an initial period of observation with minor responsibilities which increase as the student's ability is demonstrated. Enrollment is limited to experienced teachers or students who have completed Ed 106. Students must have completed or be concurrently taking the courses in Psy 123, 184 and Ed 187 or Ed 291. Credit arranged. (F, W, Sp, Su)
Staff

192. **Field Experiences with Exceptional Children.** Opportunities for contacts with retarded, emotionally disturbed, gifted, mentally ill, hard of hearing, deaf and other types of exceptional children will be provided. The candidates will study the settings and work with individuals on specific problems. Internships are provided in approved settings such as Granite School District, Tooele School District, Wyoming State Mental Hospital, Utah State Mental Hospital, and other approved institutions. Credit arranged. (F, W, Sp, Su)
Staff

193. **Psychopathology of Childhood.** A study of pathological behavior in childhood and the role of various professions in diagnosis and treatment of such behavior. (3F, Su)
Casto, Doidge

194. **A Survey of the Educational Problems of Children Having Multiple Disabling Conditions of a Nature Serious Enough to Require Special Programming.** This course deals with teaching children who are handicapped in two or more areas of functioning: physical, social, emotional, and intellectual. (3Sp, Su)
Owens

195. **Community Relations.** The people, relationships, communication, and control channels and processes outside the teacher-pupil relationship which effect the competency of the special educator. (Modes of coping are suggested in the course). (3W) R. Publicover

GRADUATE COURSES

200. **Principles of Learning in Teaching.** See Psychology 200 (3W)
Stone

114 College of Education

202. **Psychology of Adolescence.** See Psychology 202. (3Sp, Su) Langer
213. **Diagnosis of Reading.** See Elementary Education 213. (3F, Su) Mower
214. **Methods of Instruction in Remedial Reading.** See Elementary Education 214. (3W) Mower
216. **Practicum in Remedial Reading.** See Elementary Education 216. (3W, Su) Mower
224. **Characteristics of the Mentally Retarded.** See Psychology 224. (3W, Su) Halstrom, Owens
225. **Characteristics and Education of the Gifted Child.** See Psychology 225. (3Sp, Su) Halstrom
225. **Improvement of Reading in the Elementary School.** See Elementary Education 225. (3) Allred, Shaw
225. **Sociology of Deviant Behavior.** See Soc 225. (3) Pennock
235. **Theory and Practice of Play Therapy.** See Psychology 235. (3F, Su) Casto
238. **Practicum in Play Therapy.** See Psy 238. (2F, W, Sp, Su) Casto
261. **Organization and Administration of Special Education.** See Educational Administration 261. (3F, Su) Staff
266. **Applied Research in Education.** See Educational Administration 266. (3F, Sp, Su) Shaver
267. **Research in Psychology and Education.** See Educational Administration 267. (3F, Sp) Shaver
280. **Personality.** See Psychology 280. (3Sp, Su) Sharp
282. **Individual Diagnostic Intelligence Testing.** See Psychology 282. (3W) Frandsen
283. **Reading and Conference.** Provides for individually directed study in subjects of special interest and preparation. Credit arranged. (F, W, Sp, Su) Staff
285. **Research and Thesis Writing.** Individual work in thesis writing with guidance and criticism. Credit arranged. (F, W, Sp, Su) Staff
286. **Curriculum for the Gifted.** A study of curriculum designs, special and enrichment programs for gifted students. (3Sp, Su) Halstrom
287. **Basic Problems in Teaching the Mentally Handicapped.** Analysis of the emotional and social aspects of the mentally retarded child as they are related to his perception of himself and of his learning difficulties. The necessity of understanding how these children develop concepts which are essential to their learning will be stressed. Classroom procedures which facilitate the development of such concepts will form the main body of the course. (3Sp, Su) Owens, Rickert
288. **Counseling of Parents of Exceptional Children.** A study of counseling practices suited for parents of exceptional children. The special psychological problems of these parents will be emphasized. Information on local, state, and national resources for parents and children forms an essential part of the course. (3W, Su) Casto, Halstrom
289. **Diagnosis of the Mentally Retarded.** A study of methods and techniques for educational, psychological, and social diagnosis of the mentally retarded. Prerequisites: Psy 123, Ed 187. (3W, Su) Owens, Rickert
290. **Education for Mental Health in the Classroom.** Emphasizes the importance of mental health in teaching. Analysis of the concept of the healthy child in the classroom and the conditions which contribute to his growth and development. (5F, Su) Casto, Sharp, Halstrom
291. **Identification of the Emotionally Handicapped.** A study of symptoms and causes of emotionally disturbed children. Emphasis on recognition of neurotic, psychotic and socially maladjusted children in classroom settings. Prerequisites: Psy 123, Ed 290. (3F, Su) P. Publicover
292. **Education of the Emotionally Handicapped.** Discussion of school programs for emotionally disturbed children. Methods and procedures for these children in regular classroom, special classrooms and institutions will be studied. Field trips to mental institutions. Prerequisites: Ed 291. (3W, Su) P. Publicover
293. **Education of the Socially Maladjusted Adolescent.** Specific emphasis on adolescent programs in institutions such as mental hospitals, industrial schools, etc. Legal and administrative aspects of programs for disturbed adolescents will be discussed. (3Sp, Su) P. Publicover
294. **Seminar in Special Education.** Students draw from all sub-fields in Special Education to study a topic of particular interest and importance. (3W, Sp, Su) Staff

295. Methods in Presenting Literature to the Gifted. Designed to review the characteristics of the gifted, to examine his reading habits, to find methods of identifying superior and creative readers, and to improve upon discussion techniques suitable for elementary and junior high school students. (3W, Su) **Halstrom**

296. Problems and Methods in Compensatory Education. How to plan curriculum and use methods and new materials for remediation of the learning problems of the educationally disadvantaged. (3F, Su) **R. Publicover**

297. Seminar on Disadvantaged Children. A course for teachers and supervisors of disadvantaged children in which the advanced students will study under a team of professors and will do original work in the fields of curriculum, community action programs, tests and measurements, legal and administrative aspects of programs for disadvantaged children. (3Sp) **R. Publicover**

298. Vocational Habilitation for the Mentally Retarded. A study of methods and techniques in secondary methods and techniques in secondary level work-study programs for

mentally handicapped adolescents and young adults. Designed to aid teachers, vocational counselors, and related disciplines in establishing and operating community oriented work-study programs in the secondary schools. (3Sp, Su) **Rickert**

299. Teaching Language to the Disadvantaged. Effective methods to teach English to educationally or culturally deprived children, with emphasis on background material for enlargement of understanding and continued independent study. Provides background for study of generative grammars. Historical changes, psycholinguistics, semantics, and the transfer of theory into plans, materials, practice, and evaluation. (5F) **R. Publicover**

400. Continuing Graduate Advisement. Graduate students who have received maximum thesis credit, but who have not completed the thesis or dissertation, must enroll for a minimum of three credits, until the degree is completed. If the student does not comply, his candidacy may be suspended and his supervisory committee dissolved. (3F, 3W, 3Sp, 3Su.) **Staff**

College of**Engineering**

DEAN: D. F. PETERSON, JR., DCE, Rensselaer Polytechnic Institute
OFFICE: Engineering C-110B

ASSISTANT DEAN: LARRY S. COLE, DEng., Stanford University
DIRECTOR, UTAH WATER RESEARCH LABORATORY: JAY M. BAGLEY;
PhD, Stanford University
DIRECTOR, ELECTRO DYNAMIC LABORATORIES: DORAN J. BAKER,
PhD, University of Utah
DIRECTOR, ENGINEERING EXPERIMENT STATION: CLAYTON CLARK,
PhD, Stanford University
ASSISTANT TO THE DEAN: GLEN E. STRINGHAM, PhD, Colorado State
University

Research. The College of Engineering conducts an extensive program of research in the various departments through the Engineering Experiment Station. There are a number of well-equipped laboratories whose programs are well financed. These include the Utah Water Research Laboratory, the Electro-Dynamics Laboratories, the Radio Propagation Laboratory, and the Stewart Radiance Laboratory at Bedford, Massachusetts.

Graduate Assistantships and Fellowships. A number of excellent graduate assistantships, fellowships and scholarships are available in all departments giving graduate work. Assistantships are available both for teaching and research. Part-time employment is also available in research. You should apply directly to the department concerned.

Master of Engineering Science. Utah State University cooperates with the University of Utah and Brigham Young University in of-

fering a program leading to the degree of Master of Engineering Science. The prescribed course for study for this degree is published under, "College of Engineering." These prescribed courses, except thesis, may be freely exchanged between the three cooperating universities, for this degree only, without restriction.

Candidates must satisfy the admission requirements and all other regulations including examinations of the Graduate School and of the department from which he intends to graduate, except as above amended. Programs are coordinated within the College of Engineering by a representative of the Dean of Engineering. Students do not register in the academic departments but the program is supervised by a committee appointed from the departments by the Graduate School. The thesis must satisfy the requirements of the student's committee and his thesis director.

Department of

Agricultural and Irrigation Engineering

HEAD: A ALVIN BISHOP, Professor; PhD, Colorado State University; registered professional engineer; consultant, Santo Domingo, Japan, Near East and South Asia

OFFICE: Engineering C-213

BRUCE H. ANDERSON, Professor and Director, Inter-American Center for Land and Water Resources Development in South America, Merida, Venezuela; PhD, University of California; consultant, Iran

JAY M. BAGLEY, Professor and Director, Utah Water Research Laboratory; PhD, Stanford; registered professional engineer; consultant, Africa.

JERALD E. CHRISTIANSEN, Professor; CE, University of California; registered professional engineer; irrigation consultant, South America, Europe, Asia, Africa

CALVIN G. CLYDE, Professor and Assistant Director, Utah Water Research Laboratory; PhD, University of California at Berkeley; registered professional engineer

JOEL FLETCHER, Professor; MS, Utah State University

CLEVE H. MILLIGAN, Professor; MS, University of California; registered professional engineer; consultant, Iran

D. F. PETERSON, JR., Professor and Dean, College of Engineering; DCE, Rensselaer Polytechnic Institute; registered professional engineer; consultant, Near East, South Asia, and Morocco.

HOWARD B. PETERSON, Professor; PhD, University of Nebraska; consultant, Iran and Morocco

SPENCER H. DAINES, Associate Professor; MS, Kansas State University; registered professional engineer

FRED W. KIEFER, JR., Associate Professor; MS, Colorado State University

RICHARD E. GRIFFIN, Associate Professor and Water Use Extension Specialist; MS, Utah State University; consultant, Iran and Brazil

DAVID HENDRICKS, Associate Professor; PhD, University of Iowa; registered professional engineer

JACK KELLER, Associate Professor; PhD, Utah State University; registered professional engineer; consultant, Canada, Colombia, and Mexico

WAYNE B. RINGER, Associate Professor and Farm Buildings Extension Specialist; MS, Utah State University

GLEN E. STRINGHAM, Associate Professor and Assistant to Dean of Engineering; PhD, Colorado State University

ROLAND JEPSON, Assistant Professor; PhD, Stanford University

Research Engineers: FRANK HAWS, MS; EARL ISRAELSEN, MS; GAYLORD SKOGERBOE, MS

Collaborators: JAMES A. BONDURANT, MS; ALLEN DEITRICK, MS; ALLEN S. HUMPHERYS, MS; MARVIN E. JENSEN, PhD; C. W. LAURITZEN, PhD; A. R. ROBINSON, MS; LYMAN S. WILLARDSON, PhD; R. V. WORSTELL, MS

Development of irrigation systems is one of man's oldest engineering endeavors and it is even more important today than it was centuries ago. Irrigation makes arid land productive and provides a great flexibility in cropping patterns and thus will be a major factor in solving the world food problem. On the other hand, irrigation is the major consumptive user of water and is probably a major factor in the quality change in the waters of all streams providing irrigation supplies. With the world food problems and water pollution in the spotlight—superimposed on a mounting demand for water by all users—irrigation, power, industry, municipal, culinary, navigation, recreation, fish and wildlife—the challenge facing the irrigation engineer has never been greater and his opportunities and future have never been brighter. In more than 75 years of irrigation engineering experience, Utah State University has attained a world-wide prestige through the successful professional records of its many graduates. A modern complete and balanced program is available leading to both the MS and PhD degrees and the professional degree of Irrigation Engineer. The MS and PhD degrees are also offered in Irrigation Science in collaboration with related departments.

Irrigation Engineering begins with a basic understanding of the soil-plant-water relationships and includes the design of farm irrigation systems as well as the design and construction of control, conveyance, and distribution works. Proper consideration must be given to pollution problems along with the economic, administrative, and social problems involved in irrigation development. Irrigation projects often require high dams, long

tunnels, canals and pipelines, and pumping plants. Irrigation projects must be integrated with other water uses. The irrigation engineer must give careful attention to efficiencies of conveyance, application, and consumption of available water. Irrigation engineering training at Utah State University provides the broad base necessary for proficiency in any or all of these aspects of Irrigation Engineering.

Curricula and research leading to an advanced degree either on the Master's degree or Doctor's degree level are supervised by a Graduate Committee appointed by the Dean of the School of Graduate Studies. Staff members of the major department and of closely related departments serve on these committees. All study and research programs must be approved by such a committee before admittance to candidacy for an advanced degree. The study and research program for a particular degree must also satisfy all of the requirements listed in this catalog under the School of Graduate Studies.

A diagnostic examination covering the undergraduate engineering subject matter will be given to all entering graduate students. The exam includes mathematics, fluid mechanics, and soil-water-plant relationships for those seeking an Ms degree in Agricultural or Irrigation engineering. The exam includes mathematics and soil-water-plant relationships for those seeking an advanced degree in Irrigation Science.

A graduate major leading to the MS and PhD degrees is available in Hydrology or Water Resources. For more information concerning these majors see the material found in the section of this catalog for the Department of Civil Engineering.

Close interdepartmental associa-

tion with Civil Engineering, Plant Science, Soils and Meteorology is achieved to strengthen the program of those wishing special emphasis in these aspects of the science.

Agricultural and Irrigation Engineering Courses

GRADUATE AND UNDERGRADUATE COURSES

108. Engineering Aspects of Soil and Water Conservation. Extent and kinds of erosion, rates of water absorption, soil erodibility, vegetation and cultural practices. Erosion control structures, surveys for hydraulic designs for terraces, terrace outlets and soil saving dams. Tillage and farming methods, strip-cropping, erosion and alkali problems on irrigated land. Three lectures, one lab. (4F) **Stringham**

110. Irrigation Principles. Primarily for upper division students in Agriculture and colleges other than Engineering. Surveying, water measurement, conveyance and application, consumptive use of water and water requirements, pumping, drainage, and soil-water relationship. Prerequisite: Math 34. Two lectures, one lab. (3F) **Keller**

143. Irrigation Principles. For advanced engineering students. Soil, water, plant relationships; water requirements; efficiency of water use; flow of water in soil. Prerequisite: CE 142 or Math 98 and consent of instructor. Two lectures, one lab. (3F) **Keller**

145. Surface and Subsurface Drainage. The application of engineering principles to the design of surface and subsurface drainage facilities including open and covered drains, and drainage by pumping from wells. Soil properties, land reclamation, salinity problems and drain construction. Prerequisite: CE 142. Three lectures, one lab. (4Sp) **Christiansen**

146. Water Conveyance and Control. Fluid and soil mechanics are applied to problems of water conveyance and control, including canals, flumes, transitions, pipe lines, diversions, drops and chutes, spillways, checks and headgates. Prerequisites: CE 142, 150; concurrently CE 106. Three lectures, one lab. (4Sp) **Stringham**

147. Sprinkler Irrigation Design. Design of sprinkler irrigation systems including: sprinkler head types, characteristics and design; pump and pumping plant characteristics and design; sprinkler system planning and layout; economic aspects of design and operation; system maintenance, operation and management. Prerequisites: A E 143 or Math 98 and approval of instructor. (3W) **Keller**

148. Design of Farm Irrigation Systems. Application of engineering principles to the planning and design of farm irrigation systems. Includes open ditch and pipe line distribution systems for application of water by surface methods. Prerequisites: 143 and C E 142. (3Sp) **Bishop**

149. Water Law and Institutions. Laws governing the acquisition, adjudication and administration of water rights, state water codes, interstate compacts, international agreements, federal water laws and legislation, irrigation institutions, conservancy districts, water pollution control districts, state and local organizations. Three lectures. (3F) **Jeffs**

160. Water Management. Organization and administration of conservancy districts, metropolitan districts, and other water distribution institutions. Distribution of water, financing for construction and operation, maintenance of canals, flumes, pipe lines, dams, regulating reservoirs, and other water facilities. Three lectures. (3W) **Stringham**

GRADUATE COURSES

230. Special Problems in Agricultural Engineering. Independent study of chosen problems in Agricultural Engineering. Students are expected to develop initiative in pursuing these problems. Standard, formal typewritten reports required. Credit arranged. (F, W, Sp) **Staff**

231. Irrigation Science. Advanced study in irrigation, including such topics as consumptive use of water, soil moisture, irrigation, erosion, infiltration, permeability, potential theory, well hydraulics, and other irrigation engineering principles and practices. (3F) **Bishop, Milligan**

232. Sprinkler Irrigation Engineering. Advanced study of sprinkler irrigation design problems such as economic selection of irrigation systems, pumps and pumping plant analysis, water hammer and surge, uniformity of application, application rate and intensity, pipeline economics, screening and inlet devices, and special applications of sprinkler methods. (3W) **Keller**

233. Surface Irrigation Engineering. Advanced study of concepts utilized in surface irrigation design, such as: hydraulics of flow in furrows, hydraulics of flow in borders, uniformity of application, application efficiency, effects of irregular slopes, use of computers in land leveling calculations, water spreading, land reclamation, and waste disposal. Prerequisites: AE 148 and AE 231. (3Sp) **Bishop, Milligan**

245. Advanced Design of Drainage Systems. Measurements of field permeability, hydraulics of wells, pumping for drainage, leaching and reclamation of saline soils, etc. (3W) **Bishop**

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298. Graduate Thesis. Credit arranged. (F, W, Sp) Staff

273. Special Problems in Agricultural Engineering. Independent study of chosen problems in Agricultural Engineering. Students are expected to develop initiative in pursuing these problems. Standard, formal typewritten reports required. Credit arranged. (F, W, Sp, Su) Staff

274. Special Studies in Agricultural Engineering. Special registration for students who have obtained the maximum number of credits for the thesis or Plan B report and who

have not yet completed the writing of the thesis or Plan B report and who are not registered for any other courses. Credit arranged. (F, W, Sp, Su) Staff

400. Continuing Graduate Advisement. Graduate students who have received maximum thesis credit, but who have not completed the thesis or dissertation, must enroll for a minimum of three credits, until the degree is completed. If the student does not comply, his candidacy may be suspended and his supervisory committee dissolved. (3F, 3W, 3Sp, 3Su.) Staff

Department of

Civil Engineering

HEAD: ELLIOT RICH, Associate Professor; PhD, University of Colorado; registered professional engineer

OFFICE: Engineering L-162

JAY M. BAGLEY, Professor and Director Utah Water Research Laboratory; PhD, Stanford University; registered professional engineer

A. ALVIN BISHOP, Professor; PhD, Colorado State University; registered professional engineer; consultant, Santo Domingo and Japan

JERALD E. CHRISTIANSEN, Professor; CE, University of California; irrigation consultant, Uruguay and Spain

CALVIN G. CLYDE, Professor and Assistant Director, Utah Water Research Laboratory; PhD, University of California; registered professional engineer and land surveyor

IRVING DUNN, Professor; PhD, Stanford University; registered professional engineer

GORDON H. FLAMMER,¹ Professor; PhD, University of Minnesota; registered professional engineer

WILLIAM A. CORDON, Professor; MS, Utah State University; registered professional engineer

JOEL E. FLETCHER, Professor; MS, Utah State University; graduate work, University of California

CLEVE H. MILLIGAN,¹ Professor; MS, University of California; registered professional engineer; consultant, Iran and Venezuela

D. F. PETERSON, JR., Professor and Dean, College of Engineering; DCE, Rensselaer Polytechnic Institute; registered professional engineer; consultant, Near East and South Asia

WINFRED O. CARTER, Associate Professor; PhD, Stanford University; registered professional engineer

SPENCER H. DAINES,¹ Associate Professor; MS, Kansas State University; registered professional engineer

DAVID HENDRICKS, Associate Professor; PhD, University of Iowa

¹On leave.

DANIEL H. HOGGAN, Associate Professor; MS, Stanford University; doctoral work, Utah State University
NORMAN B. JONES, Associate Professor; MS, University of California
JACK KELLER, Associate Professor; PhD, Utah State University; registered professional engineer
FRED W. KIEFER, JR., Associate Professor; MS, Colorado State University; registered professional engineer
BYRON C. PALMER, Associate Professor; MS, University of Toronto
RAD MILO MARKOVIC, Associate Professor; PhD, Colorado State University
GLEN STRINGHAM, Associate Professor and Assistant to Dean of Engineering; PhD, Colorado State University
DERLE THORPE, Assistant Professor; MS, Utah State University
VANCE T. CHRISTIANSEN, Assistant Professor; MS, University of Wyoming
ROLAND W. JEPSON, Assistant Professor; PhD, Stanford University
GARY Z. WATTERS, Associate Professor; PhD, Stanford University
Research Engineer: GAYLORD SKOGERBOE, MS

This Department offers the Master of Science degree in most Civil Engineering fields and the Doctor of Philosophy degree in Fluid Mechanics, Soil Mechanics, Water Resources, Hydrology, Hydraulics, and Structures.

Curricula and research leading to an advanced degree either on the Master's degree or Doctor's degree level are supervised by a Graduate Committee appointed by the Dean of the School of Graduate Studies. Staff members of the major department and of closely related departments serve on these committees. All study and research programs must be approved by such a committee before admittance to candidacy for the advanced degree. The study and research program for a particular degree must also satisfy all of the requirements listed in this catalog under the School of Graduate Studies.

A diagnostic examination covering the undergraduate engineering subject matter will be given to all entering graduate students. The exam includes mathematics, mechanics and strength of materials, fluid mechanics, soil mechanics, and structures. Depending on the can-

didates chosen field of study, three or four parts will be taken.

Structural Engineering. Bridges, buildings of ordinary and unusual nature, structures for aircraft and space industries, and for a great variety of other purposes, all depend on the structural engineer for their design.

The foundation for structural engineering is mathematics, engineering mechanics, mechanics of materials, and properties of materials. This is reinforced with knowledge and experience obtained in design courses.

At a higher level, structural engineers study theoretical and applied mechanics and mathematics as a basis for the analysis design of complex structural forms.

Soil Mechanics. Engineering studies of soils are concerned with the ability of soils to support structures, roadways and runways, and with the economic application of engineering design to foundations. This science is relatively new, but has developed to a point where no engineer or architect can ignore the problems of investigating properties of soils in connection with engineering construction. Under-

graduate and graduate courses offered by the soil mechanics division of Civil Engineering provide the basic knowledge necessary for the design of foundations and acquaint the student with the methods and techniques required to assure safe construction of engineering projects. The program emphasizes fundamental concepts and practical ideas so that the student will be properly trained for his initial job, as well as being prepared to understand future development in this field.

Engineering Materials. Effective utilization of the elements of production, space exploration and civil works and the expanding demand for more impressive bridges, buildings, highways, canals and dams, requires modern engineering materials of increasingly high quality and sophistication. Since materials may represent a large share of the cost of a project, effective and efficient use of materials is of paramount importance.

It is the objective of materials engineering to develop effective use of available materials, to take advantage of all new knowledge and, through research and development, contribute to the technical knowledge available. Frequent contributions are made in national and international conferences and publications.

Water Engineering. Never in the history of our country has there been more concern with water. Continuing and conflicting demands for water require that the engineer today be trained to handle highly complicated water situations.

Utah State University has a long tradition of training and research in the varied and extensive aspects of water resource development and use. It has developed a well-balanced program, expanded and oriented to

provide the training needed to cope with impending water problems of this country and of the world. Teaching and research staff and facilities are continually expanding. A new engineering building with modern and well-equipped laboratories was completed in 1960. A new 60,000 square foot water research laboratory was completed in 1965.

The broad scope of water resources engineering is amply provided in a rich offering of "water" courses in the College of Engineering. Through interdisciplinary collaboration many excellent course offerings are available in other colleges. A long and continuing tradition of international collaboration in water resource work gives breadth and flavor to the overall programs. The course offerings in the Agricultural and Irrigation Engineering Department make it possible to enrich each of the following Water Engineering programs.

Water Resources Engineering and Hydrology. Hydrology is a fundamental discipline which provides the underpinning for the orderly and unified solution of most water problems.

This hydrologic foundation must be translated into policies, plans, and procedures for optimum development and utilization of the available water supply. Hydrologic considerations must be blended with a substantial body of other engineering, economic, legal and social information in the formulation of comprehensive multiple-purpose plans. The problems encountered by the water resource engineer require ingenuity, imagination and skill in engineering applications.

Considerable flexibility in the arrangement of degree programs is permitted in this field. Those with particular interest in scientific or

applied hydrology or in water resources administration, planning, and management may supplement the strong core of offerings in the Civil Engineering Department by choosing from more than 130 approved courses in the departments of Mathematics, Statistics, Computer Science, Economics, Political Science, Public Administration, Geology, Electrical Engineering, Agricultural Engineering, Agronomy, Botany and Plant Pathology, Sociology, Forest Range and Wildlife Management, and Bacteriology and Public Health.

Hydraulic Engineering. Hydraulic Engineering at Utah State University encompasses the theory of fluid mechanics and its application in a variety of engineering fields. Fluid mechanics, based on universally valid theorems of energy and momentum, and recognizing no arbitrary boundaries between fields of engineering knowledge, forms a logical core for the water engineering program. Various specialties in water engineering draw heavily on the fundamentals of fluid mechanics in the solution of hydrology, irrigation, drainage, municipal water and sewerage, and other hydraulic design problems.

A good variety and balance of courses in theoretical fluid mechanics and hydraulic design are available at the upper division and graduate level.

Water Quality Engineering. Within the hydrologic cycle, a relatively fixed supply of water is available for beneficial use. Today's demands for water exceed this available supply. Tomorrow's ever increasing demands indicate that multiple reuse of water is inevitable, thus water quality control considerations become of paramount importance.

The goal of water quality engineering becomes that of altering or upgrading quality to a level appropriate to the intended use. Water quality changes are accomplished by engineered systems, which include a concern for minimum cost consistent with health, safety and product requirements.

The graduate program in Water Quality Engineering is based on the study of fundamental considerations and principles necessary for a rational approach to design and application. In addition to the excellent complementary engineering offerings in Water Resources, Hydrology and Hydraulics, strong interdisciplinary emphasis is given in the fields of Chemistry, Biology, Mathematics and Economics.

Irrigation and Drainage Engineering. See Agricultural and Irrigation Engineering department writeup.

Civil Engineering Courses

GRADUATE AND UNDERGRADUATE COURSES

105. Elementary Structural Analysis. Analysis of stresses and deflections in statically determinate structures. Prerequisite: CE 103 or equivalent. Three lectures and one lab. (4W) **Carter, V. Christiansen, Rich**

106. Elements of Structures. Principles and practices of reinforced concrete analysis and design. Prerequisite: CE 105 or equivalent. Three lectures and one lab. (4F) **Carter, V. Christiansen**

107. Elements of Structures. Principles and practices of analysis and design of steel structures. Prerequisite: CE 105 or equivalent. Three lectures and one lab. (4W) **Carter**

108. Elementary Structural Design. Structural Geometry. Design of structures in Reinforced Concrete, Steel and Timber; general aspects, details. Special Problems. Office Practice. Prerequisites: CE 106, 107. Three lectures and one lab. (4Sp) **Staff**

120. Highway Engineering. Highway systems, planning, economy, finance, location, plans, rights of way, geometric design and roadside development. Prerequisite: CE 84 or 81. Three lectures. (3F) **Cordon**

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- 121. Highway Engineering.** Highway drainage subgrade structure, base courses, bituminous and Portland-cement concrete pavements and maintenance. Prerequisites: CE 150. Three lectures. (3W) **Jones**
- 122. Traffic Engineering and Urban Planning.** Street and highway traffic problems; principles of design and planning of thoroughfares based on operational characteristics; traffic control and regulation. Prerequisite: Instructor's consent. Three lectures. (3Sp) **Jones**
- 128. Engineering Materials.** The nature and properties of engineering materials. The influence of atomic arrangements, bonding and crystalline structure on the properties of construction materials. Three lectures. (3Sp) **Cordon**
- 129. Engineering Materials.** The properties, requirements and uses of engineering materials in modern construction. Two lectures, one lab. (3W) **Cordon**
- 130. Construction Cost Estimating.** Introduction to construction contracting, methods of preparing cost estimates, including an introduction to the Critical Path Method of planning and scheduling construction projects. Prerequisite: Instructor's consent. (3F) **V. Christiansen, Jones**
- 131. Indeterminate Structures.** Analysis of stresses and deflections in statically indeterminate structures. Prerequisite: CE 105. Three lectures, one lab. (4Sp) **Staff**
- 132. Indeterminate Structures.** Advanced problems in the analysis of indeterminate structures. Prerequisite: CE 131. Three lectures. (3W) **Carter, V. Christiansen, Rich**
- 140, 141, 142. Fluid Mechanics and Hydraulics.** Properties of fluids, the principles of hydrostatics, flow of ideal and real fluids, principles of similarity, flow of fluids in pipes and open channels, measurement of fluid flow and hydraulic principles underlying the design of turbines and pumps. Prerequisites: Math 110; concurrently GE 3, CE 92. Fall, three lectures. Winter and Spring, two lectures and one lab. (3F, 3W, 3Sp) **Clyde, Jeppson, Watters**
- 143. Fluid Mechanics and Hydraulics.** Preparatory course for graduate students majoring in fluid mechanics or irrigation who show inadequate preparation in this area. Subject matter of CE 140, 141, 142 will be covered. This course not accepted as graduate credit in fluid mechanics or irrigation engineering major. Four lectures. (4F) **Watters**
- 144. Applied Hydraulics and Pneumatics.** Theory and practice in hydraulics and pneumatics as they apply to machine tools and controls. Prerequisite: CE 140. Two lectures, one lab. (3W) **Keller**
- 150. Soil Mechanics.** Elementary physics of soil as applied to engineering problems. Moisture, plasticity, and capillary relationships. Percolation and the design of earth structures and foundations. Prerequisites: CE 103, 140. Two lectures, one lab. (3F) **Dunn, Kiefer**
- 151. Soils Engineering.** The application of engineering soil mechanics and of structural theory to design of foundations, dams, highways, and other engineering problems. Prerequisite: CE 150 or equivalent. Three lectures. (3W) **Dunn, Kiefer**
- 152. Foundation Analysis and Design.** A study of the engineering properties of soils and their effect on the design of footings, pile foundations, cofferdams, caissons, mat foundations and retaining walls. (3Sp) **Dunn**
- 165, 166. Engineering Problems (a and b).** Analysis of Engineering Problems. Application of mathematics to the solution of engineering problems. Prerequisite: Math 110. Three lectures. (3F, 3W) **Dunn**
- 173. Hydrology and Meteorology.** The hydrologic cycle, including weather elements and climate, precipitation, evaporation, transpiration, infiltration, ground water, and runoff; methods of collection of hydrologic data and their use in water supply and flood control studies. Prerequisite: CE 141, or instructor's consent. Three lectures, one lab. (4W) **Staff**
- 181. Photogrammetry.** The science or art of utilizing photographs of the earth's surface for making surveys, maps, and land utilization studies. Planimetric maps, mosaic and restituted photographs, their construction and uses. Prerequisites: ME 22, CE 81 or 84, or senior standing in Forestry, Range or Wildlife Management, Geology, Landscape Architecture, Aeronautics, or Advanced Military Science. Two lectures, one lab. (3W) **Thorpe**
- 182. Route Surveying.** Theory and practice in highway curves and earth work, including methods used in highway, street, canal, pipe line and general project surveys. One lecture, one lab. (2Sp) **Staff**
- 190. Engineering Economy.** Applications of the mathematics of finance and computing techniques to the testing of alternative engineering proposals. Various methods of financing engineering construction. Prerequisites: Math 110, Economics 51, CS 11 or GE 3. Three lectures. (3Sp, 3F) **Cordon**
- 191. Water Quality Analysis.** Chemistry of water and waste waters. Principles of solution chemistry with application to water treatment and utilization, wastewater treatment processes, and transformation in natural waters. Prerequisite: Chem 11. Three lectures, 1 lab. (4W) **Hendricks, Fletcher**

192. **Aquatic Microbiology.** See Bact 192.

193. **Municipal Water Supply and Waste Water Disposal.** Introduction to municipal water supply and waste water disposal systems. Prerequisite: CE 142. Three lectures, one lab. (4F) **Jones**

195. **Legal Aspects of Engineering.** Synopsis of the law of contracts. Writing of engineering specifications. Engineering ethics and relationships. Prerequisite: English 111. Three lectures. (3Sp) **Cordon**

GRADUATE COURSES

201, 202, 203. **Advanced Structural Theory and Design.** Advanced topics in structural theory including analysis of indeterminate frameworks, model analysis, individual problems in the design of modern structures. Prerequisite: CE 132. Three lectures. (3F, 3W, 3Sp) **Carter, V. Christiansen, Rich**

210. **Earth and Rock-Fill Dams.** Design of flexible type (earth or rock-fill) dams, utilizing naturally available materials. The theories of soil mechanics are used to check designs against criteria for structural stability and stability against seepage. Attention is given to foundations and construction details. Prerequisite: CE 150. (3W) **Clyde**

211. **Masonry Dams.** Design of rigid type dams. Stress analysis and design of gravity, multiple arch, and deck types of masonry dams, timber, steel, and miscellaneous types. Prerequisite: CE 103. (3F) **Riley**

212. **Appurtenances to Dams and Operation of Reservoirs.** Hydraulics and structural design of tunnels, gates, outlet channels, trash racks, etc. Operation of reservoirs for flood control and irrigation. Prerequisite: CE: 142. (3Sp) **Staff**

215. **Hydraulic Transients.** Unsteady flow in closed conduits, pipeline surges, water hammer, pulsating flow; unsteady channel flow, channel surges, flood waves. Prerequisites: CE 142, CS 167 or consent of instructor. (3W) **Watters**

216. **Numerical Methods in Fluid Mechanics.** Finite difference methods for solving partial differential equations are applied to fluid flow and seepage problems. Transformations are discussed which permit straightforward solutions to both fixed boundary and free surface problems. Techniques adapted to digital computers are stressed. Prerequisites: CE 241, CS 167 or consent of instructor. Three lectures. (3W) **Jeppson**

220. **Asphalts and Asphalt Mixtures.** The production, classification, physical and chemical properties, and uses of asphalts. Asphalt paving mixtures—properties, design, construction and performance. Prerequisite: Consent of the instructor. Three lectures. (3W) **Jones**

221. **Principles of Pavement Design.** Theories, principles and practices in the design of highway and airport pavements; including soil stabilization, base courses and bituminous and Portland-Cement concrete pavements. Prerequisite: CE 220. Three lectures. (3Sp) **Jones, Cordon**

222. **Highway Planning and Economics.** Economics of location and design, selection, improvement and maintenance, traffic control, administration and finance, and jurisdiction as applied to highways. Prerequisite: CE 120. Three lectures. (3F) **Cordon**

228. **Advanced Concrete Engineering.** Basic properties of concrete and concrete materials including study of admixtures and pozzolans. Significance of tests and analysis of acceptance tests, performance tests, and control tests. Concrete as a construction material. Prerequisite: CE 128 or equivalent. (3W) **Cordon**

240. **Advanced Fluid Mechanics Lab and Instrumentation.** Experimental investigation of fluid flow phenomena. Design and development of modern laboratory equipment and instrumentation. Prerequisite: CE 142 or 143. (2 to 4F) **Clyde**

241. **Intermediate Fluid Mechanics.** Nature of the fluid state, coordinate systems and fluid motions. Navier Stokes equations, exact and approximate solutions, introduction to potential flow theory, graphical flow nets, boundary layers, turbulence, fluid lift and drag, unsteady flow. Prerequisites: CE 142 or CE 143. (4W) **Clyde**

242. **Open Channel Flow.** Basic theory of uniform and varied flow in open channels and its application to the design of open channels and open channel control structures for both subcritical and supercritical flow. Prerequisite: CE 241. Three lectures, one lab. (4Sp) **Jeppson**

243. **Advanced Hydraulic Design.** Design of pipe lines, special flumes, spillways, water control structures. Prerequisites: CE 142, AE 146. (3Sp) **Staff**

246. **Porous Media Flow.** Darcy's law and the velocity potential, stream function, flow nets, Dupuit flow, complex function theory applied to seepage flow, approximate methods, analogs, seepage from canals, unsteady flow. Prerequisites: CE 141 or 143, Math 141. (3Sp) **Watters**

250. Advanced Soil Mechanics. Theories of seepage, capillarity, stress, consolidation, and stability are developed and applied to the practical design and construction of earth structures. Interpretation of laboratory tests is given special attention. Prerequisite: CE 150 or its equivalent. (3Sp) **Dunn**

251. Advanced Soil Mechanics Laboratory. Advanced laboratory work in soil mechanics to be arranged with instructor. Prerequisites: CE 150 and 250 (may be taken concurrently). (1Sp) **Kiefer**

255. Sediment Transport and Alluvial Channel Flow. Sedimentation problems, sediment transport, channel roughness and design of stable channels. Three lectures, 1 lab. (3F) **Bishop**

260. Dimensional Analysis and Similitude. The application of dimensional analysis and similitude to the solution of a variety of problems in engineering in the fields of fluid mechanics, structural analysis, vibration problems, electrical and other physical phenomena. Applications include design of experiments, interpretation of experimental data, development of equations, theory of models, and use of analogies. Prerequisite: Approval of instructor. (4) **Watkins, Clyde**

262. Water Resources Engineering Systems. Relationship of development of water resources to development of other natural resources. Historical and present concepts in water development. Systems approach to development of water resources. Prerequisite: Consent of instructor. (3F) **Staff**

263. Water Resources Engineering Institutions. Current problems and policies with regard to water resource allocation and administration. Institutional factors, interstate and international compacts and commissions, federal valley authorities, coordinating mechanisms, state and federal role in water resource development. Prerequisite: Consent of instructor. (3W) **Staff**

264. Water Resources Engineering Planning. General principles and procedures of water resource planning within a regional, multipurpose context, considerations of project formulation, alternative plans, economic and financial analysis. Prerequisite: Consent of instructor. (3Sp) **Staff**

265. Directed Reading and Special Studies in Civil Engineering. Investigations into topics of special interest in fluid mechanics, hydrology, water resources, irrigation, structures, highways, soil mechanics or other Civil Engineering specialty. Appropriate direction by staff. Discussion periods are arranged. A final report or examination is required. Prerequisite: Consent of the instructor. Credit arranged. (F, W, Sp) **Staff**

266. Hydrologic Methods. Application of mathematical, statistical and graphical techniques to the analysis of hydrologic and climatologic elements. Frequency analysis, spacial comparisons and correlations, extending records, harmonic analysis, curve fitting and smoothing computational aids (including multiple-graphical-coaxial techniques), polar graphs, monographs, electronics analog and digital devices. Prerequisite: CE 173. Three lectures. (3F) **Fletcher**

267. Flood Hydrology. Runoff process, hydrologic influences of climatic and physiographic features of watersheds, procedures of estimating runoff from rainfall and snowmelt, runoff hydrograph analyses, infiltration and loss rates, time of concentration and lag, unit hydrograph concepts, storage and flood routing, control methods. Prerequisite: CE 266. Three lectures. (3W) **Fletcher**

268. Ground Water Hydrology. Ground water in hydrologic cycle; properties affecting storage and movements; field determination of transmissibility and storage coefficient; ground water basin development and management; ground water inventory; safe yield concept; groundwater recharge and withdrawal; economic, legal and physical considerations; maintenance of groundwater quality; planned utilization and conjunctive use. Prerequisite: CE 173. Three lectures. (3Sp) **Clyde**

270. Advanced Fluid Mechanics. Application of the principles and methods of classical hydrodynamics to the solution of fluid flow problems. Prerequisite: CE 241 and Advanced Calculus or Advanced Engineering Mathematics. (3F) **Staff**

271. Advanced Fluid Mechanics. Linear and nonlinear theory of water waves, jets, selected topics from free surface hydrodynamics. Prerequisite: CE 270. (3W) **Watters**

272. Advanced Fluid Mechanics. Turbulence and boundary layers. Prerequisite: CE 271. (3Sp) **Clyde**

273. Special Problems in Civil Engineering. Independent or group study of engineering problems not covered in regular course offerings. Time and credit arranged. (F, W, Sp) **Staff**

280, 281. Theory and Design of Plates and Shells. Analysis of stresses and deflections of various shaped plates and shells with applications to aircraft, roofs, tanks, and large pipelines. Prerequisites: CE 131 or equivalent and advanced engineering mathematics. (3W, 3Sp) **Carter, V. Christiansen, Rich**

293. Water Quality Management. Natural and man-made characteristics of water quality,

effect of quality on water use planning, water quality requirements in stream pollution control, elements of physical, chemical and biological processes for treatment of water, sewage and industrial wastes. Prerequisite: Consent of Instructor. (3F) **Jones**

294, 295, 296. Water and Waste Water Treatment: Theory and Design. Theory and design of unit operations and processes for water and waste water treatment. Prerequisite: Consent of instructor. (3F, 3W, 3Sp)

Jones, Hendricks

297. Industrial Wastewaters. The nature of important water using industrial processes is presented, along with the theory, design and application of appropriate unit treatment

processes and operations for achieving water pollution control and abatement objectives. Prerequisite: CE 295. One lecture, one lab. (2Sp) **Jones**

298. Graduate Thesis. Credit arranged. (F, W, Sp) **Staff**

299. Graduate Seminar. (1Sp) **Staff**

400. Continuing Graduate Advisement. Graduate students who have received maximum thesis credit, but who have not completed the thesis or dissertation, must enroll for a minimum of three credits, until the degree is completed. If the student does not comply, his candidacy may be suspended and his supervisory committee dissolved. (3F, 3W, 3Sp, 3Su.) **Staff**

Department of

Electrical Engineering

HEAD: LARRY S. COLE, Professor; DEng, Stanford University; registered professional engineer

OFFICE: Engineering L-150

DORAN J. BAKER, Professor and Director, Electrodynamics Laboratories; PhD, University of Utah

CLAYTON CLARK, Professor and Director, Engineering Experiment Station; PhD, Stanford University; registered professional engineer

BERTIS L. EMBRY, Professor; PhD, University of Missouri; registered professional engineer

WILLIAM L. JONES, Professor; PhD, University of Utah

BRUCE O. WATKINS, Professor; PhD, University of Minnesota; registered professional engineer

DUANE G. CHADWICK, Associate Professor; MSEE, University of Washington

W. ARNOLD FINCHUM, Associate Professor; MS, Utah State University

HARRY T. FREESTONE, Associate Professor; PhD, University of Pennsylvania

ROBERT L. HEYBORNE, Associate Professor; PhD, Stanford University

ALVIN M. DESPAIN, Assistant Professor; PhD, University of Utah

IRVIN D. DUNMIRE, Assistant Professor; MS, University of Wyoming

RONNEY D. HARRIS, Assistant Professor, PhD, University of Utah

ALAN W. SHAW, Assistant Professor; PhD, Stanford University

GLEN H. SMERAGE, Assistant Professor; PhD, Stanford University

Research Engineers: FON R. BROWN, MS; CLAIR L. WYATT, MS

The graduate program in Electrical Engineering offers course work leading to the Master of Science and Doctor of Philosophy degrees. Supporting course work in Physics, Mathematics, and other

engineering departments augment the Electrical Engineering courses to provide a broad and thorough advanced study program.

Extensive research programs in the Electrodynamics Laboratories

and the Antenna and Propagation Laboratory provide a wide range of research opportunities for graduate students. Research in the areas of semiconductor devices and circuitry and automatic control systems provide further areas of graduate specialization.

Both research and teaching assistantships are available for qualified graduate students. NSF, NASA, NDEA, and some industrial fellowships also provide financial assistance for graduate students.

General requirements for the MS and PhD degrees in Electrical Engineering conform to the standards established by the Graduate School. In order to be admitted into the Electrical Engineering graduate program, the student should take the Graduate Record Examination, and the examination scores presented with the entrance application. The advanced test in either mathematics, engineering, or physics should be taken, as well as the general aptitude test. A student may be admitted on probation without the advanced GRE test, and this test must then be taken during the first quarter of residence.

The Master of Science Degree may be obtained in four quarters, providing the graduate student has had training equivalent to that required for the BS degree Electrical Engineering at USU. If his training is inadequate, additional undergraduate course work, not credited toward the MS, may be necessary. Either a thesis (6-9 credits) or a plan B design or research paper (3 credits) is necessary for the MS degree. Graduate EE Seminar is required for three quarters, but these credits (3) will not apply to the total credit hours (45) specified by the Graduate School. A graduate committee will be appointed for each candidate to

plan a specific course of study to meet both degree requirements and interests of the student.

Electrical Engineering Courses

GRADUATE AND UNDERGRADUATE COURSES

- 120. Antennas.** Fundamentals of antennas, radiation and wave propagation; directional arrays; feed lines and matching and phasing networks; antenna and field strength measurements. Prerequisites: EE 110, 116 Three lectures, one lab. (4Sp) **Clark**
- 129. Electroacoustics.** Fundamentals of architectural acoustics: theory and principles of electro-mechanical transducers, including loud speakers, microphones and vibration pickups; recording methods and equipment; measurement techniques in acoustic and electro-mechanical systems. Prerequisites: EE 113, 147. Three lectures, one lab. (4F) **Cole**
- 141. Microwaves.** Microwave generators and microwave measurements; cavity resonators; radiators; applications of ferrite and semiconductor materials to microwave systems for isolation; parametric amplification, detection, and frequency multiplication. Prerequisites: E E 110, 116. Three lectures, one lab. (4Sp) **Shaw**
- 160. Feedback Control.** Introductory theory and analysis of linear closed-loop control systems. Study of servomechanism systems containing electronic, electro-magnetic and mechanical components. Prerequisites: EE 71, and Math 110. Three lectures, one lab. (4Sp) **Watkins**
- 165. Analog Computers.** Application of analog methods to the solution of engineering problems; principles of integrators, multipliers, function generators; time and amplitude scale factors. Prerequisite: Math 110. Two lectures, one lab. (3F, W) **Embry**
- 178. Switching Circuits.** Number systems (decimal, binary, octal, etc.) Boolean algebra (postulates, theorems, applications to switching design, etc.) Logic circuit blocks (AND, OR, NAND, NOR, etc.) Logic design of switching networks; simplification methods (tabular, map, etc.). Three lectures. (3F, W) **Dunmire**
- 180, 181, 182. Analysis and Design of Electronic Circuits.** Review of transistor physics, DC operating point and stability, transistor models, small-signal single-stage amplifiers. Thermal and reliability problems. Large-signal amplifiers, multistage amplifiers, low-pass amplifiers, band-pass amplifiers, DC

amplifiers. High frequency effects, noise problems, feed-back, sinusoidal oscillators, Piecewise linear analysis of non-linear circuits, transistor switching, regenerative switching circuits. Modulation and detection, clippers, clampers, linear slope generators. Design of switching circuits including saturated mode, current mode and avalanche mode circuits. Magnetic cores, diode switching. Prerequisites: EE 147, 112. Three lectures, one lab. (4F, 4W, 4Sp). **Dunmire**

GRADUATE COURSES

185. Introduction to Semiconductor Device Theory. Basic principles of semiconductor theory; semiconducting materials; p-n junction theory, survey of new devices. Prerequisite: Modern Physics. (3F, Sp) **Jones**

201, 202, 203. Quantum and Solid State Electronics. Wave mechanics of electrons in metals and semiconductors. Band theory of solids. Theory of electrical conductivity. Dielectric, magnetic and galvanomagnetic properties of materials. Energy transitions and transition probabilities. Elements of maser theory and quantum detectors. Three lectures. (3F, 3W, 3Sp) **Jones**

208. Advanced Energy Conversion. Direct energy conversion methods. Thermionic, thermoelectric, photoelectric, piezoelectric, magneto-hydrodynamic, chemical cells, and other related topics. Prerequisite: Senior or graduate standing in Engineering. Three lectures. (3Sp) **Embry**

211. Amplifier Circuit Theory. Gain and stability analysis of tuned transistor amplifiers; design of filter amplifiers using feedback techniques; low noise amplification. Prerequisite: EE 185 (4W) **Jones**

212. High-speed Switching Devices and Circuits. Semiconductor device transient analysis, the relationship of circuit switching properties to device physics. Prerequisite: EE 185 (4Su) **Jones**

215, 216, 217. Theory of Linear Systems. Delta functions and distributions. Vectors, matrices, linear transformations. State space, state equations, input-output-state relations. Time-invariant and time-varying linear systems. Devices described by systems of linear differential equations. Nondifferential systems. Discrete-time systems. Stability. Fourier, Laplace, and Z transforms. Signal flow graphs. Controllability and observability. Three lectures. (3F, 3W, 3Sp) **Watkins**

222, 223, 224. Network Analysis and Synthesis. The mathematical analysis and design methods for two and four terminal passive networks having physically realizable driving

point and transfer immittances. Analysis and design of networks with active elements. Multiport networks; analysis and synthesis using linear vector methods. Prerequisites: EE 113 and GE 3 or CS 167 or concurrent registration in GE 3 or CS 167. Three lectures. (3F, 3W, 3Sp) **Jones**

231, 232, 233. Electromagnetic Fields and Waves. Advanced static and dynamic electric, current, and magnetic field theory; Maxwell's equations; wave equations; solution of electromagnetic field and wave problems in coordinates appropriate to various wave structures; nonclassical electrodynamics. Prerequisite: EE 116 or Physics 175. Three lectures. (3F, 3W, 3Sp) **Baker**

235. Radio Propagation. Radio wave transmission through dielectric and ionized mediums. Calculation of effects of reflection and absorption of radio waves from the earth's ionosphere with practical problems encountered in long distance communication. Introduction to magnetoionic theory. Prerequisite: EE 116 or equivalent. (3Su) **Heyborne, Clark**

236. Advanced EM Propagation. Electromagnetic wave propagation in a space containing free electrons and a constant magnetic field. Three lectures. (3F, W) **Heyborne, Clark, Harris**

237. Magnetospheric Studies. Electromagnetic wave propagation in dispersive anisotropic media with applications to the earth's ionosphere and magnetosphere. Three lectures. (3W, Sp) **Heyborne, Clark, Harris**

238. Selected Reading in Radio Science. Lecture arranged. (2 arr) **Clark, Heyborne**

239. Selected Reading in Radio Science. Lecture arranged. (2 arr) **Clark, Heyborne**

240. Microwave Measurements. Theory and practice in measurement of impedance, power, frequency and wave length at frequencies above 500 mc. Oscillators and detectors will be studied along with the characteristics of certain types of transmission lines and associated equipment in the microwave region. Prerequisites: EE 116, 141 or equivalent. One lecture, one lab. (2Su) **Clark**

242, 243, 244. Applied Plasma Dynamics. Characteristics of the plasma state; velocity distribution functions; Boltzmann equation; plasma kinetic theory; collision, diffusion, mobility, transport theory; orbit theory; interaction of plasma and electromagnetic waves; plasma oscillations and instabilities; plasma generation and hydromagnetic waves. Prerequisite: EE 114, 115, 116 or equivalent. Three lectures. (3F, 3W, 3Sp) **Harris**

130 College of Engineering

245. Transistors and Integrated Circuits. Transistor theory, transistor characteristics, and fabrication techniques used in integrated circuits. (3Sp) **Jones**

251, 252. Feedback Control Systems. Analysis, synthesis and compensation of automatic feedback control systems. Advanced linear theory. Sampled data control systems. Non-linear analysis, Stochastic signals and control. Theory of optimal control. Adaptive systems. Prerequisite: EE 160 or equivalent. Three lectures. (3W, 3Sp) **Watkins**

261. Space Science and Engineering. A survey course covering aerospace environment; vehicles and propulsion systems; orbital mechanics; instrumentation and communication systems; power sources; satellites; space exploration. Prerequisites: Physics 22, Math 110. (2W) **Barlow**

265. Particle Interactions. Collision phenomena in ionized gases; elastic scattering in central force field; scattering cross sections; ionization, excitation, and charge transfer by electron and ion impact; photoabsorption; negative ions; mobility and diffusion of electrons and ions; electronic energy distributions and drift velocities; recombination; surface phenomena; plasmas. Three lectures. (3F) **Brown**

273. Special Problems in Electrical Engineering. Independent or group study of engineering problems not covered in regular course offerings. (Time and credit arranged). (F, W, Sp, Su) **Staff**

274. Special Studies in Electrical Engineering. Special registration for students who have obtained the maximum number of credits for the thesis or Plan B Report and who have not yet completed the writing of the thesis of Plan B Report and who are not registered for other courses. (Time and credit arranged). (F, W, Sp, Su) **Staff**

275, 276, 277. Graduate EE Seminar. A weekly meeting of staff and graduate EE students. (1F, 1W, 1Sp) **Staff**

278. Seminar in Radio Science. One lecture. (1 arr) **Heyborne, Clark**

281. Radiometry. Principles of thermal emission, transmission and detection of radiant energy; detection and measurement systems. Prerequisites: Physics 22, Math 99, and EE

119. Three lectures. (3Sp) **Wyatt**

285. Introduction to Statistical Optics. Fourier transform theory, sampling theorems, two-dimensional Fourier analysis. Scalar diffraction theory, Fraunhofer diffraction. Optical imaging and Fourier analysis, coherent and incoherent light, optical systems as filters of spatial frequency, spread function and contrast transfer function, optical systems with lenses. Elements of probability theory and random processes. Spectral analysis. Processing of optical data. Resolution. Three lectures. (3F) **Despain**

291, 292, 293. Statistical Communication Theory. Statistical nature of the communication process. Random processes, time and statistical averages, Fourier analysis, spectral theory, sampling. The effects of linear and non-linear data processing on the statistical properties of signals. Wiener filters, matched filters, applied statistical decision theory. Introduction to classical information theory —quantitative definition of information, coding, Shannon's theorem. Prerequisites: Math. 40 or equivalent. Four lectures. (4F, 4W, 4Sp) **Smerage**

298. Graduate Thesis. Credit arranged. (F, W, Sp) **Staff**

400. Continuing Graduate Advisement. Graduate students who have received maximum thesis credit, but who have not completed the thesis or dissertation, must enroll for a minimum of three credits, until the degree is completed. If the student does not comply, his candidacy may be suspended and his supervisory committee dissolved. (3F, 3W, 3Sp, 3Su.) **Staff**

Department of

Industrial and Technical Education

ACTING HEAD: NEILL C. SLACK, Associate Professor; EdD, University of Missouri

OFFICE: Mechanical Arts 102

AUSTIN G. LOVELESS, Professor and Associate Director, State Research Coordinating Unit; EdD, University of Missouri

WILLIAM E. MORTIMER, Professor; EdD, University of Missouri

CHARLES W. HAILES, Associate Professor; MS, Utah State University; doctoral work, Pennsylvania State University

OWEN SLAUGH, Associate Professor; MS, Utah State University; doctoral work, Pennsylvania State University

LOWELL P. SUMMERS, Associate Professor; MS, Utah State University

LYNN R. WILLEY, Associate Professor; MS, Utah State University; doctoral work, University of Missouri

EDWARD L. FRANCE, Assistant Professor; MS Utah State University

JAMES R. HEGGEN, Assistant Professor; EdD, Utah State University

RALPH E. LONG, Assistant Professor; M.Ed. Colorado State University

SAMUEL W. MERRILL, Assistant Professor; MS, Utah State University

LOREN L. PALMER, Assistant Professor; MS, Kansas State College

CARL R. WALLIS, Assistant Professor; MS, Utah State University; doctoral work, University of Utah

EDMUND J. MANNION, Assistant Professor; MS, San Jose State College

The Department of Industrial and Technical Education in cooperation with the College of Education provides a program leading to the Doctor of Education degree in Industrial Education. The Department also provides programs leading to the Master of Science in Industrial Education and the Master of Industrial Education. The graduate degree programs are sufficiently flexible to meet the needs of individuals engaged in the various phases of Industrial Education work. The candidate is given assistance in planning an academic program which will provide cultural and professional development considered essential to educational leadership in his chosen field.

Any deficiencies must be made up before a student may be advanced to candidacy. The degree is awarded only when the candidate's

over-all record, including course work, the required examinations, the Master's thesis or paper, or the doctorate dissertation represent creditable accomplishment.

The Master of Science Degree in Industrial Education. This degree provides advanced preparation for Industrial Arts, Trade and Industrial and Technical Education teachers, and for supervisors and administrators of Industrial Education programs. A minimum of 45 quarter hours of credit beyond the Bachelor's degree is required. Of the 45 quarter hours required, nine hours are usually given for the thesis. At least 10 of the 45 hours must be in the 200 series. A candidate for the degree should select a supporting field other than Industrial Education with the approval of his advisor and supervisory committee.

The Master of Industrial Education Degree. This degree provides advanced preparation for those engaged in teaching Industrial Arts, Trade and Industrial or Technical courses, for those who supervise these programs, or for those who are Industrial Education administrators. The degree requires additional professional and technical course work in the student's area of specialization in lieu of the Master's thesis. The candidate must complete a scholarly piece of work which is designated as a Master's Paper and which carries no credit. This paper should demonstrate the student's competence in professional writing.

A minimum of 45 quarter hours of credit plus the Master's Paper are required beyond the Bachelor's degree. At least 10 of the 45 hours must be in the 200 series. A candidate for this degree should select a supporting field other than Industrial Education with the approval of his advisor and supervisory committee. A candidate for this degree is expected to have had successful industrial teaching, supervisory, or administrative experience as evaluated by his supervisory committee.

Required core for the MS and MIE Degrees:

Psy 112	Application of Statistics to Education and Psychology	3
ITE 207	Philosophy of Vocational Education and the Practical Arts	3
ITE 209	Curriculum Development in Industrial Education	3
ITE 224	History of Industrial Education	3
ITE 254	Measurement in Industrial Education	3
ITE 275	Research in Industrial and Technical Education	3
ITE 271	Research and Thesis Writing	9
(9 hours of technical courses required, to include ITE 200, for MIE in place of ITE 271.)		27

Doctor of Education degree in Industrial Education. This degree program is administered jointly by the Colleges of Education and Engineering. It is a planned program of advanced study in the total field of Industrial Education. It is designed for individuals who are presently engaged in one or more of the phases of Industrial Education. For information concerning admission and completion requirements, contact the Head of the Department of Industrial and Technical Education.

Industrial and Technical Education Courses

GRADUATE AND UNDERGRADUATE COURSES

103. The General Shop. Comprehensive study of the types of "General Shop," its advantages and limitations; content and organization of subject matter; method of teaching and shop plans. General shop projects, shop plans and new trends in content and equipment are given special consideration. (3Su) **Staff**

104. Occupational Analysis. Principles and practice in analyzing occupations. Students complete an analysis of one unit for a trade or occupation. (3F, W, Su) **Staff**

168. Industrial Arts for Elementary Schools. Objectives and theory of Industrial Arts in the elementary school. Suitable instructional content will be presented for each grade level and methods of teaching and organizing instructional materials will be carefully considered. Instruction is given on the use of tools and materials in the shop where projects suitable for the elementary school will be constructed from modern industrial materials. Two lectures, one lab. (3W) **Staff**

190. Special Industrial Education Workshop. Allows for conducting special workshops, as needed, especially for the in-service training of Industrial Education teachers, supervisors, and administrators. May be repeated as needed providing the workshops are different, but if the credit is to be used toward a Baccalaureate or Master's Degree, limitations shall be placed by the department or student's Graduate Committee. Credit arranged. (F, W, Sp, Su) **Staff**

191. Industrial Safety Education. The psychology and philosophy of accident causation and prevention in school, home, community,

and industry. Stresses the various aspects of safety in many areas and includes organization, administration, and coordination of safety education programs. (3W, Sp, Su) **Hailes**

192. Personnel Relations. Training for leadership in industry as foremen, supervisors, and directors. Problems in organizing, supervising, training, and directing personnel. Directed conferences based on student experiences and directed studies in leadership problems and principles. (3F, Sp) **Hailes**

198. Special Problems in Industrial Education. For qualified students majoring in Industrial Education who wish to do specialized work not covered by other courses. Credit arranged. (F, W, Sp, Su) **Staff**

199. Related Technical Training in Vocational Education. A course provided for students enrolling in industry and factory schools conducted on the university level, wherein instructors, course content, and facilities have been approved by a committee functioning through the Industrial and Technical Education Department. This course may be repeated for a maximum of nine quarter hours credit, to be acquired at a rate not to exceed one and a half quarter hour credits per 40 clock-hour week. Students should not expect to acquire more than three credits in this course in any one calendar year except where teacher training courses are of longer duration. Regular university fees must be paid, and registration procedures followed. Credit arranged. **Staff**

GRADUATE COURSES

200. Industrial Education Experimental Lab. Designed to give selected senior students and graduate students in Industrial Education opportunity for experimental work with new tools, equipment, materials, and processes for improved program development and teaching techniques. May be repeated up to a total of six hours credit. Credit arranged. (F, W, Sp, Su) **Staff**

205. Trade, Industrial, and Technical Workshop. Provides opportunity for professional improvement and upgrading of trade, industrial, and technical teachers. Dissemination of current technical and professional material that the instructors must be aware of to maintain their position in the teaching of industrial subjects. Credit arranged. **Staff**

206. Vocational and Technical Administration Workshop. Provides opportunity for professional improvement of administrators and supervisors of vocational and technical programs. Credit arranged. (Su) **Staff**

207. Philosophy of Vocational Education and the Practical Arts. Designed to enrich and expand understanding of the nature and purposes of vocational education and practical arts, their relationships and differences, and the place each phase of the work should have in a public school program. (3F, Su) **Mortimer**

209. Curriculum Development in Industrial Education. The significance, importance, and use of the course of study in industrial education. Actual construction of a comprehensive course of study for one of the phases of industrial education. Prerequisite: ITE 104. Three lectures. (3W, Su) **Loveless**

210. Trends in Industrial Education. A preview of industrial education tomorrow; what industrial education will do. The evaluation of educational and industrial thought; the source of materials to meet present day trends. (3Su) **Staff**

224. History of Industrial Education. Historical developments of manual and industrial education from the early leaders to the present. Emphasis is given to the influence that various leaders and movements in both Europe and America have had upon present-day objectives of industrial arts and vocational industrial education. (3W, Su) **Slack**

232. Aerospace Education. An introduction to aerospace for teachers in elementary and secondary schools, to include such content areas as: (1) A study of the principles of flight, (2) Knowledge of the earth's atmosphere, (3) The control of aircraft in flight, (4) Information on the federal airways and airports, (5) The principles of jet propulsion, and (6) An opportunity to take an orientation flight, and also receive some basic instruction in handling an aircraft in flight. Nationally known speakers will be used as resource specialists throughout the course. (3Su) **Staff**

240. Cooperative Industrial Programs. For potential coordinators of part-time cooperative industrial and technical classes. Essential information for conducting federally and non-federally reimbursed work experience industrial classes in secondary and post-high schools. (3Su) **Staff**

245. Organization of Industrial Education Programs. The laws, regulations, and policies affecting industrial and technical education programs; organization of industrial and technical programs at the secondary and post high vocational and technical institute level; local, state, and federal relationships. (3Sp, Su) **Staff**

251. Administration and Supervision of Industrial Education. Administration, organization, supervision, and management necessary for successful operation of Industrial Education programs. (3Sp, Su) **Staff**

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254. Measurement in Industrial Education. Construction and use of the various types of tests and rating scales used in Industrial Education. Emphasizes measurable factors in industrial education and the types of tests best suited to this field. The elements of statistical methods necessary for intelligent use of the tests. Prerequisite: Psychology 112. (3Sp, Su) **Mortimer**

261. Problems of Adult Education. Development of Adult Education movements; learning abilities, educational interests, needs of adults, organization of evening school programs, apprenticeship training, and related instruction for trade programs. (3Sp, Su) **Slack**

267. Reading and Conference. Provides for study in advanced and specialized problems in Industrial Education. Problems are selected with approval of department adviser; investigation is carried on under direction of the major professor. Credit arranged. (F, W, Sp, Su) **Staff**

270. Seminar in Industrial Education. Gives opportunity for investigation and reporting of individual problems. (1 to 2Sp, Su) **Staff**

271. Research and Thesis Writing. Provides for individual work in thesis writing in industrial education. Credit arranged. (F, W, Sp, Su) **Staff**

275. Research in Industrial and Technical Education. To provide teachers, supervisors and directors of industrial and technical programs with research methods and techniques which are applicable to their programs. Includes interpretation of various kinds of research. The conducting of a research project is part of the class activity. (3F, Su) **Loveless**

355. Internship in Industrial and Technical Programs. Designed for the advanced student working toward the Doctor of Education degree in Industrial Education. Student works under the direct guidance of an administrator or supervisor of Industrial and Technical programs in the public schools. Credit arranged. (F, W, Sp, Su) **Staff**

365. Advanced Independent Study in Industrial Education. Provides opportunity for advanced student to do independent study in the field of Industrial and Technical education. Credit arranged. (F, W, Sp, Su) **Staff**

371. Research for the Doctorate Thesis in Industrial Education. Credit arranged. (F, W, Sp, Su) **Staff**

400. Continuing Graduate Advisement. Graduate students who have received maximum thesis credit, but who have not completed the thesis or dissertation, must enroll for a minimum of three credits, until the degree is completed. If the student does not comply, his candidacy may be suspended and his supervisory committee dissolved. (3F, 3W, 3Sp, 3Su.) **Staff**

Department of

Manufacturing Engineering

HEAD: CARL D. SPEAR, Associate Professor; PhD, University of Utah

OFFICE: Technical Services Building

BRUCE O. WATKINS, Professor; PhD, University of Minnesota

REYNOLD K. WATKINS, Professor; PhD, Iowa State University

RAWSON D. CHILD, Associate Professor; MS, Utah State University

W. KARL SOMERS, Associate Professor; MS, Utah State University

G. MERRILL SHAW, Associate Professor; MS, Utah State University; registered professional engineer

OWEN K. SHUPE, Associate Professor; PhD, University of Utah

The graduate program in Manufacturing Engineering provides course work leading to the Master of Science degree. To meet individual interests, the graduate student may select one of three

options to be taken along with the Manufacturing Engineering core. There options are: Engineering Administration, Manufacturing Systems Design, Applied Statistics and Computer Science. General re-

quirements for the Master's degree are:

1. To be accepted as a candidate an applicant must: (a) hold a Bachelor of Science degree from an institution of recognized standing in one of the fields of Engineering or Physical Science, (b) have had adequate preparation for graduate study in the chosen field of specialization, and (c) show promise of doing well in advanced study as judged by previous scholastic record and other achievements.

2. The Master of Science curriculum must include at least 45 credits numbered 100 or above, with at least 10 credits in courses numbered 200 or above. A total of 9 credits of acceptable graduate work may be transferred from another approved graduate school. A maximum of 18 credits may be taken at off-campus residence centers maintained by Utah State University. A minimum of 15 credits, exclusive of thesis, must be completed on the Logan campus. Additional requirements, such as qualifying examination, final examination, time limit, etc., as outlined by the School of Graduate Studies, are included.

3. Selection of specific courses in the curriculum will be under advisement of a Supervisory Committee which is appointed by the Dean of the Graduate School.

The candidate's program will include a selection of courses in the following areas:

	Credits
Manufacturing Engineering Core	21
Thesis	9
Minor—(option in Engineering Administration, Manufacturing Systems Design, or Applied Statistics and Computer Science) Minimum	15
—	—
Total	45

An integrated program may be selected from the following courses:

Manufacturing Engineering Core:

	Credits
Applied Statistics (Ap St 131, 132, 176)	11
Computer Science (CS 167)	3
Metal Machining (Mfg. E 251)	5
Value Engineering (Mfg E 258)	3
Methods Engineering (Mfg E 280)	3
Material Handling (Mfg E 283)	3
Manufacturing Seminar (Mfg E 287)	2
Special Problems (Mfg E 273)	3
Automation Systems (Mfg E 290)	3
Thesis (Mfg E 298)	9

Engineering Administration:

	Credits
Production Management (BA 136)	5
Accounting for Mgt Control (BA 209, 210)	6
Elem. of Micro Econ Theory (Econ 100) ..	3
Managerial Economics (BA 250)	3
Administrative Control (BA 212)	3

Manufacturing Systems Designs:

Computer Programming (CS 145, 146)....	3
Mechanical Analysis (ME 131)	4
Mechanical Design (ME 132)	4
Mechanical Design Projects (ME 133) ..	4
Dynamics of Machinery (ME 135)	4
Feedback Control (EE 160)	4
Advanced Mechanics of Material (ME 165)	4
Dimensional Analysis and Similitude (CE 260)	4

Applied Statistics and Computer Science:

Computer Programming (CS 145, 146)....	3
Design of Experiments (Ap St 134)	4
Industrial Statistics (Ap St 221)	3
Operations Research (CS 245, 246)	6

Manufacturing Engineering Courses

GRADUATE COURSES

240. Advanced Material Science. Theoretical aspects of materials; structure of crystalline and non-crystalline materials; phase equilibria; surfaces and interfaces; imperfection and flow of matter. A quantitative treatment of material properties. Prerequisite: consent of instructor. Three lectures. (3Sp) **Spair**

251. Metal Machining. Accelerated study of metal machining concepts including basic machine tool operations, cutting tool geometry, cutting metallurgy and machinability, machining economics, process capability studies for dimensional conformance, mechanics of chip formation, cutting, dynamometry, and grinding principles. Prerequisite: graduate student in Engineering. Three lectures, two labs. (5F) **Somers**

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258. Value Engineering. Principles and techniques of value analysis and engineering as applied to all phases of manufacturing. Organization requirements for an effective value system. Effective techniques for completing engineering staff work. Prerequisite: Mfg E 158. Three lectures. (3F) **Shaw**

273. Special Problems in Manufacturing Engineering. Independent or group study of engineering problems not covered in regular course offerings. (Time and credit arranged.) **Staff**

274. Special Studies in Manufacturing Engineering. Special registration for students who have obtained the maximum number of credits for the thesis or Plan B Report and who have not yet completed the writing of the thesis or Plan B Report and who are not registered for other courses. (Time and credit arranged) **Staff**

280. Methods Engineering. Work measurement methods; the application of work simplification methods in industrial organizations. Prerequisite: Mfg E 180. Two lectures, one lab. (3W) **Child**

283. Materials Handling. Analysis of material handling problems, selection of material handling equipment and problems in the design of integrated handling systems. Prerequisite: Mfg E 183 or consent of instructor. (3Sp) **Shaw**

287. Manufacturing Seminar. Students prepare technical papers on suitable topics and present to Mfg E staff and graduate students. Two lectures. (1F, W, S) **Spear**

290. Automation Systems. Design of automated production systems; special emphasis on electronic, hydraulic and pneumatic controls as applied to numerically controlled and other automated production equipment. Prerequisites: EE 124, CE 144, Mfg E 181. Three lectures. (3Sp) **Staff**

298. Graduate Thesis. Credit arranged. (F, W, Sp, Su) **Staff**

400. Continuing Graduate Advisement. Graduate students who have received maximum thesis credit, but who have not completed the thesis or dissertation, must enroll for a minimum of three credits, until the degree is completed. If the student does not comply, his candidacy may be suspended and his supervisory committee dissolved. (3F, 3W, 3Sp, 3Su.) **Staff**

Department of

Mechanical and Aerospace Engineering

HEAD: REYNOLD K. WATKINS, Professor; PhD, Iowa State University; registered professional engineer

OFFICE: Engineering L-180

IZYDOR EISENSTEIN, Associate Professor; Diploma Engineering, Israel Institute of Technology, Haifa; and doctoral work, Purdue University

RUSSELL M. HOLDREDGE, Associate Professor; PhD, Purdue University

A. RONALD MCKAY, Associate Professor; MEng'r and doctoral work, McGill University

OWEN K. SHUPE, Associate Professor; PhD, University of Utah

CARL D. SPEAR, Associate Professor; PhD, University of Utah

EDWARD W. VENDELL, JR., Associate Professor; PhD, Oklahoma State University

J. CLAIR BATTY, Assistant Professor; MS, Utah State University; doctoral work, Massachusetts Institute of Technology

ROBERT D. HARRIS, Assistant Professor; MS, Utah State University

ALMA P. MOSER, Assistant Professor; PhD, University of Colorado

ALBERT B. SMITH, Assistant Professor; MEng'r, The Agricultural-Mechanical College of Texas

This department offers a graduate program leading to the Master of Science degree and the Doctor of Philosophy degree in Mechanical Engineering. The Doctor of Philosophy program is supported by research capability in Civil Engineering, Electrical Engineering, National Reactor Testing Station, and Industries.

The Master's degree program allows for specialization in one of the following areas: Applied Mechanics, Fluid Dynamics, Nuclear Engineering, Materials, Propulsion, Energy Conversion, and Heat Transfer.

Research and teaching assistantships are available for qualified graduate students. In addition, some financial assistance is available through NSF, NASA, NDEA, and other governmental agencies as well as some industrial firms.

Following is a typical course of study leading to the degree of Master of Science in Mechanical Engineering:

Mechanical Engineering Courses

GRADUATE COURSES

- 202. Theory of Plasticity.** The analysis of stresses, deformation, and collapse in devices constructed of plastic material. Prerequisite: ME 166. Three lectures. (3F) **Moser**
- 205. Introduction to Elasticity.** The interrelationship of stresses and/or strains, properties of the material, and the configuration of an elastic media under a given load. Prerequisite: ME 166. Three lectures. (3W) **Moser**
- 206. Theory of Elasticity.** A continuation of ME 205; elementary problems in three dimensions; two dimensional problems solved by Airy's Stress Function; complex variables and conformal mapping as applied to elasticity problems; and other advanced techniques. Prerequisite: ME 205. Three lectures. (3Sp) **Moser**
- 210. Transport Phenomena.** Systematic and parallel treatment of momentum transfer (viscous flow), heat transfer, and mass transfer. Treatment stresses similarities. Prerequisites: ME 117 and ME 116 concurrently. Three lectures. (3F) **Holdredge**
- 211, 212. Advanced Thermodynamics.** Advanced topics of classical and statistical thermodynamics. Prerequisite: ME 113. Three lectures. (3F, 3W) **Vendell**
- 216, 217, 218. Advanced Heat and Mass Transfer.** Advanced topics concerning mass transfer and heat transfer by conduction, convection, and radiation. Prerequisite: M.E. 210. Three lectures. (3W, 3Sp, 3Su) **Holdredge**
- 230. Advanced Kinematics.** Review of vector analysis; Analytical methods; complex numbers and their application in kinematic analysis and synthesis; geometry of constrained motion: The Euler Savary equation; Hartmann's Construction; Bloch Synthesis; Freudenstein's Theorem; The Hrones-Nelson synthesis of the four-bar linkage; the analysis of space mechanism. Prerequisite: ME 130. Three lectures. (3Sp) **Harris**
- 240, 241, 242. Intermediate Gas Dynamics.** Intermediate topics in the flow of compressible fluids, shock, boundary layer theory, flow tables, thermodynamic considerations. Prerequisites: ME 117 and ME 143. Three lectures. (3F, 3W) **McKay**
- 261, 262. Theory of Vibrations.** Review of vibrations of linear systems, finite degrees of freedom. Normal modes and material frequencies by matrix methods. Nonlinear systems. Graphical methods. Analog and digital computer techniques. Analysis of transverse, longitudinal, torsional, and flexural vibrations in continuous elastic media. Prerequisite: ME 162. Three lectures. (3W, 3Sp) **Moser**
- 290, 291, 292. Nuclear Reactor Engineering Principles.** Transport theory and neutron diffusion; homogeneous reactors with and without reflector; heterogeneous reactors; reactor materials; design, operation, and control of nuclear reactors; reactor kinetics. Three lectures (3F, 3W, 3Sp) **Shupe**
- 293, 294, 295. Nuclear Reactor Laboratory.** One laboratory. (1F, 1W, 1Sp) **Shupe**
- 298. Graduate Thesis.** Credit arranged. (F, W, Sp) **Staff**
- 400. Continuing Graduate Advisement.** Graduate students who have received maximum thesis credit, but who have not completed the thesis or dissertation, must enroll for a minimum of three credits, until the degree is completed. If the student does not comply, his candidacy may be suspended and his supervisory committee dissolved. (3F, 3W, 3Sp, 3Su.) **Staff**

College of**Family Life**

DEAN: PHYLLIS SNOW, PhD, Cornell University

OFFICE: Family Life 201

All departments offer the Masters degree and the Clothing and Textiles and Food and Nutrition departments offer the PhD degree. The latter's programs are interdepartmental ones with the College of Science and the College of Agriculture.

Courses may be arranged so that an MS degree can be obtained through summer quarter work, provided the research project is done on the job during the winter months.

Curricula and research leading to either advanced degree are supervised by a graduate committee appointed for each candidate by the Dean of the School of Graduate Studies. Staff members of the major department and of closely related departments serve on these committees. All study and research programs must satisfy the requirements listed in Part I of this catalog and must be approved by the student's committee before admittance to candidacy can be obtained.

The Institute for Research on Man and His Personal Environment was established in 1967 and provides opportunities for research study of man as a totality with

respect to his physical, social, and psychological response to his man-made environment, particularly clothing, textiles, home furnishings, and housing.

In ever increasing numbers, the mature, "interrupted career" woman who holds a bachelor's degree in family life education is returning to the College in pursuit of an advanced degree. Career opportunities are endless. The demand for research workers and educators in the universities, government, and private agencies, business, and industry far exceeds the supply of competent personnel available.

A number of excellent graduate assistantships are available both for teaching and research. Applications should be sent directly to the department concerned.

The following Family Life course is available for graduate students in each department of the College:

293. Research Methods. Research methodology for case studies, surveys, and experiments; design and style for theses and research reports; application of measurements and statistical techniques to professional problems in Family Life. A research report presenting and analyzing findings of a study in the student's major field is required. (3F) **Staff**

Department of

Clothing and Textiles

HEAD: ANNE P. KERNALEGUEN, Associate Professor; PhD, Utah State University

OFFICE: Family Life 303

RUTH E. HAWTHORNE, Associate Professor; PhD, Ohio State University

THETA JOHNSON, Associate Professor and Extension Specialist; MA, Columbia University

SUSAN RICHARDS, Assistant Professor; MS, University of California

Master of Science Degree. The Clothing and Textiles Department offers study and research to qualify for a Master of Science degree, with emphasis in the areas of clothing design, consumer problems, textiles, or the socio-psychological aspects of clothing.

Doctor of Philosophy Degree. Advanced study and research are available leading to the degree of Doctor of Philosophy in the Behavioral Science Aspects of Clothing and Textiles. To fulfill the requirements for the degree, the student must (a) Demonstrate a reading comprehension of one foreign language. (b) Pass a comprehensive examination in the field of specialization and in the minor field of Psychology or Sociology and Anthropology. (c) Successfully complete a research problem and a satisfactory dissertation. The student should consult the Head of the Department concerning specific requirements.

Graduate teaching assistantships and research assistantships are available. Research is promoted through departmental relationships with the University Research Council and other private, public and federal agencies.

Clothing and Textiles research staff and graduate students are af-

filiated with the Institute for Research on Man and His Personal Environment.

Clothing and Textiles Courses

GRADUATE AND UNDERGRADUATE COURSES

105. Clothing Selection and Consumption. Analysis of clothing needs of men, women, and children at various stages of the life cycle. Factors affecting clothing expenditures; production and distribution of textile products for the consumer market. Emphasis is placed upon clothing selection in relation to aesthetic and economic influence. (2W, Sp)

Staff

106. Behavioral Science Aspects of Clothing. Clothing as a reflection of culture and personality. Analysis of clothing within selected primitive and contemporary cultures in relation to societal value structures. Study of the effects of clothing on the development and adjustment of the individual self. (2F, W)

Staff

****114. Fashion Illustration.** Instruction will be given on fashion techniques in line and halftone in drawing the figure in fashion proportions for the newspaper, magazines and reproduction for the professional field. Included in the course will be designing for the professional field through the drawing of fashions as well as fashion accessories for women, men and children. Prerequisite: CT 14. (3F)

Lewis

115. Fashion Design. Fashion designing for reproduction, considering the wearer, the fabric, and the ensemble. Sources of inspiration for fashion designing. Individual experimental

**Taught 1969-70

tion through sketching with application directly to fabrics. (3Sp) **Lewis**

135. History of Costume and Textiles. A study of costume and textiles development from ancient times to the present as related to the socio-economic, cultural, and political influences of the times and their importance in the evolution and inspiration of modern textiles and dress. (5F) **Clayton**

***140. Draping.** Creative experiences in dress design by draping fabric on the dress form. Emphasis is placed on fitting and the effect of pattern, grain, and textures on design and dress. Problems consist of making a French lining and draping two garments. Prerequisite: Clothing and Textiles 120. (3F) **Hawthorne**

****170. Advanced Flat Pattern Designing.** Application of the principles of dress design to the construction of patterns by flat pattern method. Emphasis is placed on the development and use of a basic sloper, and on the interpretation of a design in relation to clothing construction principles and in the making and designing of patterns. Prerequisite: Clothing and Textiles 120. (3F) **Hawthorne**

174. Advanced Textile Problems. Emphasis is placed on recent textile advances and research techniques. Consideration is given to physical and chemical testing and use of the microscope in identification of fibers. Prerequisite: Clothing and Textiles 24. Recommended: Chem 10, 11, 12. (3W) **Richards**

180. Tailoring. Application of tailoring techniques in the construction of suits and coats. Emphasis is placed on developing judgment and skill in the use of alternative techniques. Prerequisite: Clothing and Textiles 120. Recommended: Clothing and Textiles 170. (3W) **Clayton**

186. Fashion Analysis. Socio-economic factors underlying fashion; fashion designers and markets; analysis of fashion media—industry publications, magazines, newspapers, radio and television; merchandise displays and fashion show production. Prerequisite: Clothing and Textiles 105, 106 or consent of department. Recommended: Speech 181, Journ 184, Business Administration 156. (3Sp) **Staff**

GRADUATE COURSES

204. Economics of Clothing and Textiles. Study of current theories and research on consumer clothing-oriented behavior; factors affecting the production, distribution, and consumption of clothing and textile products; the role of the clothing and textile industries in the national economy. (3Sp) **Staff**

205. Consumer Behavior in Clothing and Textiles. Emphasis is placed on the behavioral science concept of consumer behavior as these apply to the utilization of knowledge and current textile and clothing technology, standards for manufacture, and legislation. Consumption patterns of textiles and clothing are also studied. (3F) **Staff**

206. Advanced Behavioral Science Concepts in Clothing. Analysis and synthesis of basic concepts of cultural anthropology, sociology, and psychology with implications for clothing and textiles. Interpretation of research findings. Formation of new hypotheses based upon the conceptualizations studied. (3F) **Staff**

208. Cultural Bases of Clothing. Study of clothing as a communicative device with respect to technological advancement, societal values, and social role enactment. Analysis includes detailed consideration of the concepts of beauty, acculturation, symbolism, modesty, social stratification, and reference group theory applied to clothing-oriented behavior. Prerequisite: CT 206. (3W) **Staff**

210. Personality Projection Through Clothing. A developmental approach to the study of clothing. Emphasis is placed upon the interrelationships among the self, the body, and clothing at each stage of the life cycle. Detailed consideration will be given to the processes of differentiation-integration, identification, self structure, self valuation, and self adjustment in relation to clothing-oriented behavior. Prerequisite: CT 206. (3Sp, Su) **Staff**

***280. Graduate Seminar: Clothing and Textiles in Education.** Study of contemporary issues and philosophy in clothing and textiles subject matter in relation to general educational objectives at all levels of learning. Clothing and textile programs in secondary and higher education, cooperative extension, and continuing education will be considered, as well as the area of vocational education. (2W) **Staff**

***281. Graduate Seminar: Aesthetic Aspects of Dress.** To identify aesthetic concepts of dress and appearance and relate them to generalizations from philosophy and psychology. To consider theoretical and empirical approaches to the study of aesthetics as a basis for better understanding the aesthetics of dress. (2Sp) **Hawthorne**

*Taught 1968-69

*Taught 1968-69

****282. Graduate Seminar: Textile Technology.** A study of various aspects of textile technology and fabric maintenance. Emphasis will be placed on problems such as soiling, laundering, shrinkage, weathering, colorfastness, biological factors, and wrinkle resistance. Current research in these areas will be of greatest concern. (2W) **Richards**

290. Independent Study. Credit arranged. (F, W, Sp, Su) **Staff**

****291. Graduate Seminar: Current and Special Topics.** A study of current trends and issues applying to specialized fields in clothing and textiles. Gives opportunity for investigation and reporting of individual problems. (2Sp) (Maximum 6) **Hawthorne**

293. Research Methods. See Family Life 293. **Compton**

294. Research Colloquium. Discussions of advanced theories and research in Clothing Textiles. Analyses of dissertations and other ongoing research projects. (1F, W, Sp, Su)

295. Research and Thesis. Credit arranged. (F, W, Sp, Su) **Staff**

400. Continuing Graduate Advisement. Graduate students who have received maximum thesis credit, but who have not completed the thesis or dissertation, must enroll for a minimum of three credits, until the degree is completed. If the student does not comply, his candidacy may be suspended and his supervisory committee dissolved. (3F, 3W, 3Sp, 3Su.) **Staff**

****Taught 1969-70**

Department of

Family and Child Development

HEAD: DON C. CARTER, Professor; EdD, Columbia University

OFFICE: Family Life 215

C. JAY SKIDMORE, Professor; EdD, Columbia University; postdoctoral work and fellowship, Merrill-Palmer Institute

DOROTHY B. LEWIS, Associate Professor; MS, Iowa State University

CARROLL C. LAMBERT, Assistant Professor; MS, Utah State University

JAY D. SCHVANAVELDT, Assistant Professor; PhD, Florida State University

JANE MECHAM, Instructor; MS, Utah State University

ALISON THORNE, Lecturer; PhD, Iowa State University

The Department of Family Living and Child Development offers work leading to the Master of Science degree. Two separate majors are available for graduate study. You may select the one in which you are most interested. The majors are (1) Child Development and (2) Marriage and Family Relations.

Majors in child development specialize in nursery education, with related work available in other departments such as psychology, education, and sociology. If you select this major, you will have an opportunity to work in an internship program in nursery education, in-

cluding nursery school supervision, leading to occupational placement in college teaching, nursery school teaching or administration, and activity programs for hospitalized children.

Majors in marriage and family relations will study in a program intended to provide preparation for teaching, either at the college or high school level, for extension service work in family life education, or for further study toward a higher degree in marriage counseling or marriage and family life education.

Family and Child Development Courses

GRADUATE AND UNDERGRADUATE COURSES

100. Human Growth and Development. Growth and development from birth to maturity. General behavior patterns characteristic of different levels of maturity; individual differences and needs. Prerequisites: Psychology 53 and FCD 67. (3F, W, Sp) **Carter**

108. Guidance of the Young Child. Review of development principles with emphasis on social and emotional growth; guidance philosophy, principles and techniques. Two lectures. Two hour lab weekly. Prerequisites: Family and Child Development 67. (3F, W, Sp) **Lewis, Mecham**

115. Growth of the Infant. Readings in child development from conception to fifteen months of age, with discussion of infant care. Prerequisite: Family and Child Development 67. (3W) **Lewis**

120. Marriage. Engagement; marriage relationships; understanding of self. For men and women. (3F, W, Sp) **Carter**

125. Family Life Education. Study of parent, teacher, and community needs in relation to problems of education for family life. In-service training for teachers and group leaders in family life programs. Methods of family life education. (3Sp) **Skidmore**

140. The Family in its Social Setting. Family interaction with the environment. Family influences on children's creativity. Impact on families of our technological, affluent society. Family and technical change in other cultures. (3F, W, Sp) **Thorne**

150. Seminar. Study of topics in current literature plus independent reading selected according to interest. (2Sp) **Carter**

164. Nursery School Planning and Administration. Development of the nursery school movement. Problems of physical plant, equipment, public relations, staff and budgeting of the child care center. (3Sp) **Lewis**

174. Nursery School Methods. Methods and techniques of guidance of pre-school children individually and in groups, with emphasis on the study of one child. Readings in research on pre-school children. Must parallel Family and Child Development 175. (3F, W, Sp, Su) **Lambert**

175. Practice Teaching in the Nursery School. Experience in application of generalizations regarding guidance, growth, and development of children in the nursery

school. For juniors and seniors who have had a substantial amount of professional course work, including Family and Child Development 108 and 164. Arrangements must be made for practice teaching well in advance of registration. (6F, W, Sp, Su) **Lambert**

180. Marriage Counseling. The philosophy principles, and techniques of pre-marital and marriage counseling. (3F) **Skidmore**

185. The Family in the Middle and Later Years. Family development, and problems of grown children and their parents; parents on their own; understanding older family members. (3W) **Skidmore**

GRADUATE COURSES

205. Child Psychology and Guidance. See Psychology 205. (3F, W, Sp) **Frandsen**

208. Seminar in Child Guidance. Study and analysis of theories and philosophies of central importance in defining the nature, process, and structure of child guidance. (3Su) **Staff**

251. Seminar in Family Relations. Analysis of selected topics in family relations. (3W) **Carter**

252. Seminar in Child Development. Analysis of selected topics dealing with growth, behavior, and development of the child. (3F) **Schvaneveldt**

253. Current Research in Child Development. Review of new research dealing with the growth and development of young children. (3W) **Schvaneveldt**

254. Current Research in the Family. Review of new research dealing with family relationships. (3S) **Schvaneveldt**

267. Deprivation in Early Childhood. Effects of deprivation on the preschool child; application of nursery school methods and curriculum to children with restricted and limiting backgrounds; the child and his family. (3S) **Carter**

275. Internship in Nursery Education. Work with young children in a situation involving limited supervision and personal responsibility for program planning and direction. Emphasizes experimental methods in working with children, and development of insight into children's behavior. Credit arranged. (F, Sp, Su) **Lambert**

278. Practicum in Agencies Serving Children. Experience in working in agencies serving children. Limited to advanced students who have completed Family and Child Development 174 and 175. Time and credit arranged. (F, W, Sp) **Lambert**

280. **Marriage Counseling.** Theory and practice in premarital, marriage and family counseling. (3W) **Skidmore**

281. **Marriage Counseling Practicum.** Supervised practice in marriage counseling in the university, community agencies, and private setting. (Credit arranged) **Skidmore**

287. **Family Theory and Frameworks.** Various theories and conceptual frameworks of family study are defined, explored, and delineated. Emphasis is on the concepts and basic assumptions employed by various frameworks. The history and development of each, the present emphasis, and projected usage of each framework is also considered. (3F) **Schvaneveldt**

290. **Independent Study.** For qualified students upon consultation with the instructor. Credit arranged. (F, W, Sp, Su) **Staff**

293. **Research Methods.** See Family Life 293. (3W) **Compton**

295. **Research for Master's Thesis.** Credit arranged. (F, W, Sp, Su) **Staff**

400. **Continuing Graduate Advisement.** Graduate students who have received maximum thesis credit, but who have not completed the thesis or dissertation, must enroll for a minimum of three credits, until the degree is completed. If the student does not comply, his candidacy may be suspended and his supervisory committee dissolved. (3F, 3W, 3Sp, 3Su.) **Staff**

Department of

Food and Nutrition

HEAD: ETHELWYN B. WILCOX, Professor; PhD, Iowa State University

OFFICE: Family Life 111

PHYLLIS SNOW, Professor and Dean, College of Family Life; PhD, Cornell University

MARGARET B. MERKLEY, Associate Professor; PhD, Texas Women's University

FLORA BARDWELL, Associate Professor; MS, Utah State University

DELOY G. HENDRICKS, Assistant Professor; PhD, Michigan State University

RUTH WHEELER, Assistant Professor; MS, University of Washington

The demand for qualified people with advanced degrees in Nutrition and Food Science far exceeds the supply. The student who chooses this program will have many fine opportunities for positions in university research and teaching; in state, federal, or private research laboratories; in extension work as a specialist; and in food industries. Departmental course work is built on the root disciplines of mathematics and statistics, chemistry, physics, physiology, and microbiology.

Through interdepartmental curricula, MS and PhD degrees are

available in Nutrition and Biochemistry and in Food Science and Technology. In addition the MS degree is offered in Food and Nutrition.

General requirements are given in Part I of this catalog. Detailed requirements may be obtained upon request from the department head.

Assistantships. The department has three teaching assistantships. The number of research assistantships depends upon the grants obtained. Applications should be directed to the head of the department and should be received before February 1.

Food and Nutrition Courses

GRADUATE AND UNDERGRADUATE COURSES

107. Science in Relation to Food Preparation. Scientific principles underlying modern food theory and practice. The relation to food preparation of the physical and chemical properties of proteins, starches, sugars, leavening agents, and pigments; the properties of true solutions and principles of crystallization; colloidal systems—gels, sols, foams, and emulsions. Laboratory experiments designed to illustrate the effect of varying ingredients and preparation procedures on the quality of food products. Prerequisite: Organic Chemistry, FN 23. (3F, W) **Staff**

108. Science in Relation to Food Preparation. Continuation of FN 107. (3W, Sp) **Staff**

109. Experimental Foods. Objective tests in food research. Development, execution, written and oral interpretations of individual problems. Prerequisite: FN 108. (3Sp) **Staff**

143. Advanced Nutrition. The study of the various nutrients and their interrelations. Laboratory problems include energy and dietary requirements of humans, small animal studies, and some laboratory methods of nutritional analysis. Four lectures and one lab. Prerequisites: FN 22, biochemistry, and Physiol. 4. (5W) **Wheeler**

145. Diet Therapy. Application of dietetic principles to health maintenance including dietary modifications necessary in pathological conditions, pregnancy, and childhood. Four lectures and one laboratory. Prerequisite: Food and Nutrition 140. (5Sp) **Wheeler**

***146. Food Processing in Relation to Consumer Use.** Methods of manufacture, preservation and storage of food products and their influences on the physical structure, chemical composition, and nutritive value of foods; requirements and specifications for quality standards; implications for the consumer in shopping for food. Prerequisite: FN 108 or consent of instructor. (2F) **Staff**

****147. Food Economics.** Availability and utilization of food as affected by national economic systems, methods of distribution and other relevant economic and cultural factors in relation to current and projected world and local nutritional problems. Prerequisites: FN 108 and one course in economics or consent of instructor. (2F) **Staff**

180. Quantity Foods Preparations. Principles of food preparation applied to large quantity production; standardization of food quality, menu planning and study of production costs.

The course is planned particularly for juniors and seniors majoring in dietetics and institutional management. Prerequisite: FN 108 (#5F) **Wheeler**

182. Institutional Organization, Management and Cost Control. Principles of scientific management applied to large service units. Emphasis on organization of large food service units, on personnel management and human relationships, sanitation problems, food purchasing, record keeping, and varied aspects of money management as it affects food service in institutions. Prerequisite: FN 180. (41W) **Wheeler**

183. Institutional Equipment Selection, Maintenance, and Layout. Determination of large and small equipment requirements for food service units; factors governing quality, capacity, care of operation and maintenance of institutional equipment; and arrangement of working units for maximum efficiency. IPerequisite: FN 182. (3Sp) **Wheeler**

GRADUATE COURSES

200. Laboratory Methods in Nutrition Research. This course is designed to teach basic techniques used in nutrition research through the chemical determinations of constituents in blood and urine of human subjects. Prerequisites: Organic Chemistry and Biochemistry. (3W) **Hendricks**

201. Laboratory Methods in Nutrition. Nitrogen balance study; mineral, and vitamin determinations. Prerequisites: FN 143 and IBiochemistry. (2Sp) **Staff**

203. Nutrition Research; Micro-Chemical Analysis. Micro-chemical determinations of vitamin and other constituents in small amounts of blood. Prerequisites: Organic Chemistry and Biochemistry. Taught as needed. (3) **Staff**

207. Laboratory Methods in Foods Research. Application of the experimental method to advanced problems in food research. Prerequisite: FN 109, Organic Chemistry. Taught as needed. Credit arranged. **Staff**

230. Human Nutrition. Metabolism of carbohydrates and minerals as applied to nutritional requirements and food supplies of people. IPerequisites: FN 140 or 143 and Biochemistry. (3F) **Hendricks**

231. Human Nutrition. Metabolism of lipids and proteins as applied to nutritional requirements and food supplies of people. Prerequisite: FN 140 or 143 and Biochemistry. (3W) **Wilcox**

*Taught 1968-69

**Taught 1969-70

232. **Human Nutrition.** Metabolism of vitamins; critical analyses of methods used in assessing human nutrition status; evaluation of nutritional problems of current interest. Prerequisites: Food and Nutrition 140 or 143 and Biochemistry. (3Sp) **Hendricks**

233. **Readings in Foods.** A critical review of scientific literature in the field of foods. Prerequisite: Food and Nutrition 109. Taught as needed. (3) **Staff**

243. **Nutrition and Growth.** Relation of nutrition to growth from the prenatal period to old age. Prerequisite: Food Nutrition 140 or 143. Taught as needed. (3) **Staff**

275. **Problems in Institutional Administration.** Directed study on selected problems in quantity foods or institutional management for graduate students. Credit arranged. (Taught as needed; Su) **Wheeler**

290. **Independent Study.** Credit arranged. (F, W, Sp, Su) **Staff**

291. **Graduate Seminar.** Reports and discussions on current literature. (1F, W, Sp) **Staff**

293. **Research Methods.** See Family Life 293. (3W) **Compton**

295. **Research and Thesis.** Credit arranged. (F, W, Sp, Su) **Staff**

400. **Continuing Graduate Advisement.** Graduate students who have received maximum thesis credit, but who have not completed the thesis or dissertation, must enroll for a minimum of three credits, until the degree is completed. If the student does not comply, his candidacy may be suspended and his supervisory committee dissolved. (3F, 3W, 3Sp, 3Su.) **Staff**

Department of

Homemaking Education

HEAD: VIRGINIA H. HARDER, Assistant Professor: MS, Iowa State University
OFFICE: Family Life 318

The department offers three programs for the Master of Science degree.

Plan I. This program is designed especially for those who wish to supervise the student teaching experience or take other home economics supervisory positions. The basic plan requires 45 credits. Research and thesis or Plan B reports may be conducted during the school year in on-going classroom situations. Evidence of a minimum of two years of successful teaching on the secondary level must be presented before the degree is granted.

Plan II. This program is designed for either the recent graduate in home economics or for the experienced teacher. Emphasis is given to acquiring some depth in subject matter, curriculum development, and instructional techniques.

Plan III. This program is flex-

ible to meet individual needs and is particularly applicable for extension home economists who need community development emphasis as well as subject matter strength. The basic program requires 45 credit hours. Included is research and thesis or Plan B reports.

Professional certificate. The department will supervise a 55-hour planned program which requires a minimum of 12 quarter hours in professional education (which may include educational psychology), and 12 quarter hours in subject matter. This program culminates in a professional certificate. The professional certificate requires evidence of no less than three years of successful teaching experience, and is issued on recommendation of the department to the state certification agency.

The graduate program may be

associated with the College of Family Life Institute for Research on Man and His Personal Environment, which provides opportunities for study of man as a totality with respect to his physical, social, and psychological responses to his environment.

Home Economics Education Courses

GRADUATE COURSES

217. **Current Developments in Home Economics Education.** Newer developments in home economics education at the secondary level. Offered as needed. (3) **Harder**

237. **Seminar.** Opportunity for investigations and reporting on individual problems. Credit arranged. (F, W, Sp, Su) **Staff**

290. **Independent Study.** Credit arranged. (F, W, Sp, Su) **Staff**

293. **Research Methods.** See Family Life 293. (3W) **Compton**

295. **Research for Master's Thesis.** Credit arranged. (F, W, Sp, Su) **Staff**

400. **Continuing Graduate Advisement.** Graduate students who have received maximum thesis credit, but who have not completed the thesis or dissertation, must enroll for a minimum of three credits, until the degree is completed. If the student does not comply, his candidacy may be suspended and his supervisory committee dissolved. (3F, 3W, 3Sp, 3Su.) **Staff**

Department of

Household Economics and Management

HEAD: EDITH NYMAN, Associate Professor; MS, Utah State University; graduate work, Michigan State University

OFFICE: Family Life 314

LOUISE J. PEET, Lecturer; PhD, Iowa State University

The Department of Household Economics and Management offers work leading to the Master of Science degree. Flexibility in program planning provides opportunity for developing individual abilities and interests. Course work is arranged in cooperation with other departments of the University, including: Economics, Sociology, Psychology, Philosophy, Business Administration, Physics, Statistics, Chemistry, Family and Child Development, Food and Nutrition, and Clothing and Textiles.

A graduate assistantship is available as resident advisor at the Home Management House.

Household Economics and Management Courses

GRADUATE AND UNDERGRADUATE COURSES

100. **Household Equipment.** Principles of selection, use, care, and arrangement of kitchen and laundry equipment. (3F, W, Sp) **Staff**

110. **Advanced Equipment.** Special Problems and performance testing of major appliances and small pieces of equipment now on the market. (3W, Sp) **Staff**

149. **Home Management.** The theory of effective home management; values and goals reflected in decision-making on family resources. (3F, W, Sp) **Nyman**

150. **Home Management House.** The application of the theory of management in a living situation. Residence in a Home Management House

provided for a five-week period. Application must be made with instructor in advance of registration. Prerequisites: Food and Nutrition 22, 23, 25 or its equivalent: Household Economics and Management 149. (4F, W, Sp)

Staff

151. Home Management Problems. Substitution for HEM 150 for married students only. The application of the theory of management as applied in students' homes. Prerequisites: Foods and Nutrition 22, 23, 25 or its equivalent; Household Economics and Management 149. (4F)

Nyman

155. Family Finance. Consideration of major financial alternatives available to families; some factors that determine financial decisions. (3F, W, Sp)

Nyman

160. Seminar. Reports and discussion of current readings in Household Economics and Management. (2Sp)

Staff

165. Advanced Housing. Organization and use of space in various types of dwelling units, house design, and remodeling for different family stages. (3F, Sp)

Staff

175. Consumer Education. The role of the family and its members as consumers; current aspects of consumer behavior; agents involved, i.e. government, the market, consumer interest groups. (3F, W, Sp)

Nyman

190. Independent Study. For qualified students upon consultation with the instructor. Credit arranged. (F, W, Sp, Su)

Staff

197. Honors Studies. See Family Life 197. Credit arranged. (F, W, Sp, Su)

Staff

198. Honors Seminar. See Family Life 198. (2W)

Staff

249. History and Philosophy of Home Management. History and Development of Home Management as a field of study from the early years of Home Economics to the current time. (3F)

Nyman

GRADUATE COURSES

260. Graduate Seminar. Review of current literature in Household Economics and Management. (1W)

Staff

290. Independent Study. For qualified students upon consultation with the instructor. Credit arranged. (F, W, Sp, Su)

Staff

293. Research Methods. See Family Life 293.

Compton

295. Research for Master's Thesis. Credit arranged. (F, W, Sp, Su)

Staff

400. Continuing Graduate Advisement. Graduate students who have received maximum thesis credit, but who have not completed the thesis or dissertation, must enroll for a minimum of three credits, until the degree is completed. If the student does not comply, his candidacy may be suspended and his supervisory committee dissolved. (3F, 3W, 3Sp, 3Su.)

Staff

College of**Humanities and Arts**

DEAN: CARLTON F. CULMSEE, PhD, State University of Iowa

ASSISTANT TO THE DEAN: MARLAN D. NELSON, MA, Stanford University; doctoral work, State University of Iowa

OFFICE: Library 229

Department of**Art**

HEAD: HARRISON T. GROUTAGE, Professor; MFA and additional graduate work, University of Utah and State University of Iowa

OFFICE: Main 308

JESSIE LARSON, Professor; MFA, University of Washington; studied at Art Students' League of New York, University of New York, Colorado Springs Fine Arts Center, Utah State University, Cranbrook Academy of Art, and Kunstgewerbeschule, Zürich, Switzerland

EVERETT C. THORPE, Professor; MFA, University of Utah; advanced study, Syracuse University and with Hans Hofmann in Massachusetts

TWAIN C. TIPPETTS, Professor and Coordinator of Fine Arts; EdD, University of California at Los Angeles

LARRY E. ELSNER, Associate Professor; MFA, Columbia University; advanced study, Cranbrook Academy of Art

GAELL LINDSTROM, Associate Professor; MFA, California College of Arts and Crafts

JON ANDERSON, Assistant Professor; BPA, Art Center School; MFA, Utah State University

RALPH T. CLARK, Assistant Professor; BPA, Art Center School

ADRIAN VAN SUCHTELEN, Assistant Professor; MFA, Otis Art Institute

Challenging opportunities for graduate study and creative performance are available in many areas of the Art Department. Students may choose to qualify for either the general more liberal Master of Arts degree or the more specialized and professional Master of Fine Arts degree.

Master of Arts Degree. This is the liberal studies degree in art at the graduate level. General requirements are listed in the graduate

section of the general and graduate catalogs. Required in this degree is a proficiency in one or more foreign languages to be approved by the Department of Modern Languages. Other departmental requirements are the same as numbers 1), 2), 3), 4), 5), 6), and 7) under the heading of *Master of Fine Arts Degree*.

All graduate art students are urged to plan for participation in the annual Fine Arts tours of Eu-

rope and Latin America. Annual fall tours to San Francisco, California, to visit the galleries, museums, Broadway plays, San Francisco Opera, and other events are required of all graduate students.

Master of Fine Arts Degree. This is a specialized professional degree. In 1959 the College Art Association of America approved the MFA degree rather than the PhD degree as the terminal degree in the studio arts. An exceptional student devoting full time might qualify after four quarters of residence for the degree; it is generally considered to require an average of two years to satisfactorily complete this degree. The accumulation of credit hours and the number of quarters in residence are not major factors in the completion of this degree. However, minimum credit and resident hours must be completed. Emphasis is placed on creative artistic and technical achievement.

1) A portfolio of original work clearly showing the student's present level of accomplishment in all art areas but more particularly in the area of his selected specialty, should be submitted for faculty evaluation prior to registration for any Art Department course work. A written or verbal report of the evaluation will be given the student with suggested courses of study. Courses required to correct any apparent deficiencies will not be counted as graduate credit.

2) Not later than the second quarter in residence, a committee will be appointed by the art department chairman to supervise and assist with the student's graduate work. Also, not later than the second quarter, the student will decide with the aid of his committee the direction his work will take and

at the time formulate his Thesis Statement.

3) A complete written and illustrated record of all graduate project work must be kept current for inclusion in a printed thesis. Details of the nature of the thesis may be obtained from the graduate director of the Art Department.

4) At least one month prior to graduation the student must design a comprehensive exhibit of his graduate work and be responsible for its display. All paintings, drawings, photographs, or prints must be appropriately matted or framed. Sculpture and ceramics must be carefully displayed on suitable stands or tables or in exhibit cases. Suggestions for the exhibit will be made by the student's graduate committee, but the candidate is solely responsible for the design and display of his show which will be considered an important conclusion to his graduate work. A display area should be selected with the help of the committee chairman and reserved at least three months before exhibition time. All work to be shown in the exhibit should be selected with the help of the graduate committee. Regardless of the number of credit hours accumulated or courses completed, the degree will be granted only on approval of the graduate committee which will recommend the time of the student exhibit.

5) At the discretion of the faculty, one or more works from the master exhibit may be selected for the University Permanent Collection.

6) Prior to the final oral examination, an adequate selection of colored 35mm slides of the master exhibit should be presented to the committee chairman. The slides will be retained in the Art Department

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as a permanent record of the graduate show.

7) Two quarters of successful work in the graduate seminar, 273, and Philosophy 164 (Aesthetics) are required of all MA and MFA degree candidates.

Because the MFA degree is highly individualized, the student should consult the Department or his graduate committee for more detailed information on requirements.

Art Courses

GRADUATE AND UNDERGRADUATE COURSES

101. Contemporary European Arts and Crafts. An art appreciation course devoted to an investigation of current European creative efforts in painting, sculpture, and the varied crafts. Taught only on the summer art tour of Europe. (3Su) **Tippetts**

103. High Renaissance Art. A more specialized Art History class studying the works of Leonardo Da Vinci, Michelangelo and Raphael, master painters of the Italian High Renaissance. Taught only on the summer art tour of Europe. (3Su) **Tippetts**

104. Life Drawing. Anatomical and interperative studies of the figure with emphasis on composition and creative use of materials. (3Sp) **Elsner, Groutage, Van Suchtelen**

105. Advanced Drawing and Composition. Emphasis is given to composition, graphic concepts and extensive exploration of drawing media. Prerequisites: Art 5, 8, 12, 104 or equivalent. (3Sp) **Van Suchtelen, Groutage, Thorpe**

106. Drawing Studio. Advanced individual drawing problems in various media. Prerequisites: Art 104 and 105. Credit arranged. (F, W, Sp) **Van Suchtelen**

109. Landscape Painting. Various approaches and techniques in landscape painting, in oil and related media. Field trips. Prerequisites: Art 8, 14. (3F, Sp) **Thorpe**

110. Modern European Painting. This course will investigate some of the major trends in contemporary European painting. Major attention will be devoted to the "School of Paris" and modern Italian painters. This will be taught only on the summer art tour of Europe. (3Su) **Tippetts**

111. Watercolor and Related Media. Students may use any aqueous medium or combination. Several lab periods will be spent sketching out-of-doors. Prerequisite: Art 11. (3F, Sp) **Lindstrom**

112. Portrait Painting. Problems of portrait painting with emphasis on the literal representation of form structure and likeness. Various ages and racial types are studied. Prerequisites: Art 8, 14. (1Sp) **Thorpe, Groutage**

113. Watercolor Studio. Advanced painting problems in watercolor and related media. Prerequisite: Art 111. Credit arranged. (F, Sp) **Lindstrom**

115. Fabric Design. (applied) Projects in creating original designs and applying them to suitable textiles in techniques of silk screen printing, free-hand painting, block printing, stencil or batik. Prerequisite: Art 5. (3Sp) **Larson**

116. Fabric Design. (structural) Projects in creating original designs and reproducing them in hooked rugs, upholstery fabrics, wall hangings, etc., and in various dramatic hangings and covers done in creative stitchery. Prerequisite: Art 5. (3F) **Larson**

117. Fabric Design Studio. Advanced individual projects in structural and applied fabric design. Prerequisites: Art 5, 6, 7, 115, and 116. Credit arranged. (F, Sp) **Larson**

119. Metalsmithing. Continuation of Art 19. Introduction of forging of flatware and sand casting. Emphasis on original design of holloware, flatware, or other objects of the student's choice. Prerequisite: Art 19. (3Sp) **Staff**

120. Jewelry Casting. Continuation of Art 20. Introduction of centrifugal investment casting, using wax as the creative medium. Original design of various types of jewelry; techniques necessary for the completion of the metal product. Prerequisite: Art 19. (3F, Sp) **Esner**

121. Jewelry and Metalism Studio. Advanced individual problems in various media. Prerequisites: Art 19, 119, 120. Credit arranged. (Sp) **Esner**

127. Painting Studio. For advanced stuents in painting; students are encouraged to develop their ideas through the processes of experimentation in various applications in oil and related media. Work may be done in representational or non-representational areas. Prerequisite: Art 14. Credit arranged. (W, Sp) **Tiorpe**

128. Photography Studio. Designed to cover several phases of photography with emphasis on composing what we see in an artistic manner. Also, to allow Senior photo majors and selected Junior students to work with more concentration in their major area. Credit arranged. (F, W, Sp, Su) **Clark**

130. Ceramic Hand Building Techniques. A course devoted to the production of pottery using techniques such as coils, slabs, pinching, etc. Large pieces can be produced quite easily with these techniques and will be encouraged. In addition, glazing and decorating will be an important part of this course. Prerequisites: Art 5, 6, 7, 30, 31. Credit arranged. (F, W, Sp) **Lindstrom, Elsner**

131. Glaze Calculation. Calculation of glaze formulas: operation of the kilns. Prerequisites: Art 5, 6, 7, 30, 31, 130. (3F, 3W, 3Sp) **Lindstrom, Elsner**

132. Ceramic Studio. Advanced work in area selected with the aid of the major professor. Prerequisites: Art 5, 6, 7, 30, 31, 130, 131. Credit arranged (F, W, Sp) **Lindstrom, Elsner**

135. Color. Color as a design element in stage lighting, painting, and everyday living. Physical, psychological and artistic aspects are correlated. (3Sp) **Reynolds**

136. Art Photography. Means of producing fine photographs. (3F) **Reynolds**

137. Art Photography. Texture, composition, lighting and print quality. (3W) **Reynolds**

138. Art Photography. Introduction to color, color film, color harmonies, multiple exposures and other techniques necessary to produce fine color work. (3Sp) **Reynolds**

140. Applied Interior Design. Practical application of art elements and principles of design to problems of home decoration and furnishings. Prerequisite: Art 40. (3W) **Larson**

142. Interior Design Studio. A laboratory course devoted to such activities as the designing and constructing of two and three dimensional models, interiors, elevations and decorative details—traditional and contemporary, public and domestic. To be taken in conjunction with or following Art 140. (W) **Larson**

143. Advanced Problems in Interior Design. Experimental projects in home planning and furnishing. Prerequisites: Art 40, 140, 142. (Sp) **Staff**

144. Interior Design Apprenticeship. A course designed to acquaint students who are planning to enter interior designing professionally to actual business procedures as practiced by

reputable, well-trained interior designers who have been approved by USU Arts Staff. (1-5F, Sp, Su) **Larson**

151. Art Methods for Elementary Grades. Methods of teaching drawing, painting, design and handwork in the elementary schools. Required preparation for a grade school teacher. (3F, W, Sp) **Reynolds**

152. Art Methods for High School. Methods of teaching art in high school. How to motivate work in drawing, painting, design, and crafts. Required of all majors and minors in art on secondary teaching level. (3W) **Reynolds**

153-154. Art Education Workshop. Help will be given on methods of presentation of many materials and techniques of practical value to the elementary and secondary teacher; chart making, posters, murals, dioramas, maps, color theory and harmony, weaving, basketry, gift making, flower and weed arrangements, and many other subjects. The workshop will give art instruction on the grade levels in which the teacher instructs. (3-5Su) **Reynolds**

157. Photography for Publication. Photography for newspaper coverage of news events and sports, and for illustration in other media. Designed to meet specific needs of students who will prepare illustrated articles for publication. (3F) **Staff**

160. Advanced Sculpture. Individual sculptural expression in a variety of plastic media. Emphasizes aesthetic employment of form and the techniques for working in wood, stone, metal, plaster and clay. Prerequisites: Beginning sculpture Art 60. This course may be repeated 6 times for credit. (3F, W, Sp) **Elsner**

163. Sculpture Studio. Advanced individual problems in various media. Prerequisites: Art 60 and 160. Credit arranged. (F, W, Sp) **Elsner**

164. Photo Illustration. The major uses of photography in commercial advertising are stressed. Typical magazine and newspaper assignments are used on an individual project basis. Imaginative new ideas, novel techniques, and sensitive design layouts are emphasized. This course may be repeated a maximum of three times for credit. Admission only by permission of the instructor. (5F, W, Sp) **Clark**

165. Advanced Photo Portraiture. Intensive studio work and "on-the-job" portrait assignments are used to develop the insight and photo techniques necessary to produce portraits of consistently high quality for commercial studio, advertising, and editorial purposes. Admission only by permission of instructor. (5F, W, Sp) **Clark**

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166. Advanced Fabric Design in Weaving. Special projects in applying original designs to creative weaving of tapestries, rugs and dramatic textiles. Prerequisites: Art 5 and 66 or equivalent. (3 to 5F, W, Sp) **Larson**

167. Color Printing. Students are taught how to make consistently high quality photographic color prints from their own negatives. Project assignments are given to cover a wide range of subjects under various lighting conditions. Prerequisites: Photo 53, 54, 57, and 58. (3F, W, Sp) **Clark**

168. Advanced Publications Photography. Actual story assignments require the preparation of detailed shooting scripts, editorial selection of promising prints, cropping and final presentation of photo stories. Projects vary from single to multiple picture coverage. Admission only by permission of instructor. (5F, W, Sp) **Clark**

169. Spinning and Dyeing. Spinning and dyeing of wool, flax and other fibers in the production of special yarns for creative hand-weaving—artistic rather than commercial application emphasized. Prerequisites: Art 66. To be taught simultaneously with Art 166, Advanced Fabric Design in Weaving. (3W) **Larson**

170. Photography Laws and Regulations. A lecture course designed to fit the needs of photography and journalism majors and minors, and other students who may use the camera as a reproductive tool, by dealing with laws, regulations, principles, and practices governing photography. Included are copyright regulations, libel, model release, right of privacy statutes, courtroom regulations, photographic etiquette, and others. (1F) **Hansen**

171 and 271. Special Studio Courses. Individual work in any one or more of the following as approved by the instructor concerned: Design Studio, Painting Studio, Printmaking Studio, Photography Studio, Sculpture Studio, Experimental Media Studio, Metalsmithing Studio, Ceramics Studio. Credit arranged. (F, W, Sp) **Staff**

181. Advanced Lettering. Finished letters for magazine and newspaper advertisements, packaging labels and symbols. Prerequisite: Art 81. (3W) **Anderson**

182. Advanced Advertising Design. Theory of designing the cover, page, package, letterhead and poster. The course trains the student in producing professional advertising which would enable him to find employment in this field. Prerequisite: Art 82. (3F, W, Sp) **Anderson**

183. Advanced Illustration. A course to prepare the student for the specialized field of illustration that exists today. To have the student experiment in different techniques and media, and learn which to use for different types of reproduction in newspaper or magazines. To learn to research a problem and meet deadlines. Prerequisite: Art 83. (3Sp) **Anderson**

184. Commercial Art Studio. Advanced Commercial Art problem with emphasis on designing displays, industrial design packaging, and projects in second and third dimensions. Rendering in a variety of media for the portfolio. Prerequisites: Art 5, 6, 7. (3Sp) **Anderson**

185. Advanced Architectural Rendering. To perfect architectural renderings in various media to suit the students own style in preparation for commercial work. Prerequisite: Art 85. (By special arrangement) (3Sp) **Anderson**

191. Woodcut. The making of prints from designs cut in the plank grain of wood using from one to many colors. (3F) **Groutage**

192. Serigraphs. The study of various techniques in silk screen printing including glue, tusche glue, cut paper, and lacquer film for the purpose of making multiple original works of art. (3W) **Groutage**

193. Lithography. Producing prints from drawings on limestone. (3Sp) **Groutage**

194. Intaglio. Production of prints from metal plates using various etching and engraving techniques. (3W, Sp, Su) **Groutage**

195. Printmaking Studio. Individual production in prints—any technique. Prerequisite: Art 191 or 192 or 193 or 194. (F, Sp, Su) **Groutage**

GRADUATE COURSES

206. Drawing Studio. Designed to further develop the student's creative attitude through the exploitation of various drawing media and to guide him toward the direction of a personal idiom, during the process of exploring graphic concepts. Prerequisite: Graduate status. Credit arranged. (F, W, Sp) **Van Suchtelen**

210. Thesis Photo Problems. A seminar type course designed to aid graduate students in their photographic problems related to their thesis. Discussions will lend themselves mostly to methods of obtaining necessary photographs to supplement the thesis study. Students will be given information pertaining to the preparation of photos, charts, graphs, etc for insertion into the final thesis. (1W) **Hansen**

213. Watercolor Studio. For graduate students doing the major part of their work in watercolor. All work and projects will be individually planned with the instructor's help. It is mainly individual instruction and criticisms and evaluations. Prerequisite: Graduate status. Credit arranged. (F, W, Sp)

Lindstrom

217. Fabric Design Studio. Advanced projects of original design executed in techniques of applied paints, dyes, etc., to fabric; structural stitchery; or weaving Prerequisites: Art 115, 116, 166 and Graduate status. Credit arranged. (F, W, Sp)

Larson

221. Jewelry and Metal Studio. Advanced individual problems in various media. Prerequisites: Graduate status. Credit arranged. (F, W, Sp)

Elsner

227. Painting Studio. To provide an advanced painting studio opportunity for graduate students in which they develop further towards a professional stature. Emphasis is placed upon the individual attainment of a personal conviction or direction in painting. Prerequisite: Graduate status. Credit arranged. (F, W, Sp)

Staff

228. Photo Studio. Designed to cover several phases of photography with emphasis on composing what we see in an artistic manner. Also, to allow graduate students to further emphasize the area of their chief interest such as Advertising-Illustration, Industrial, Portraiture, etc. Prerequisite: Graduate status. Credit arranged. (F, W, Sp)

Clark

232. Ceramic Studio. Graduate studio in ceramics. Work is planned on an individual basis with reference to the graduate student's speciality. All work is carried on in the lab with individual help and criticisms. Prerequisite: Graduate status. Credit arranged. (F, W, Sp)

Lindstrom

243. Problems in Interior Design. Complete, professional presentations of actual or simulated projects in interior designing of domestic or public buildings and research projects in contemporary or traditional design media. Prerequisites: Art 142, 143 and Graduate status. Credit arranged (F, W, Sp)

Larson

263. Sculpture Studio. Advanced individual problems in various media. Prerequisites: Art 60, 160 and Graduate status. Credit arranged. (F, W, Sp)

Elsner

272. Art Research and Thesis Problems. Credit arranged. (F, W, Sp)

Staff

273. Art Seminar. Directed individual study in assigned and elected problems later presented and analyzed at group discussions. Credit arranged. (F, W, Sp)

Staff

284. Commercial Art Studio. Advanced commercial art problems in advertising, illustration, displays, package design, lettering, and projects in second and third dimension rendering in a variety of media for the portfolio. Prerequisite: Graduate status. Credit arranged. (F, W, Sp)

Anderson

295. Print Studio. Intensive individual production in advanced printmaking techniques. Prerequisite: Graduate status. Credit arranged. (F, W, Sp)

Groutage

400. Continuing Graduate Advisement. Graduate students who have received maximum thesis credit, but who have not completed the thesis or dissertation, must enroll for a minimum of three credits, until the degree is completed. If the student does not comply, his candidacy may be suspended and his supervisory committee dissolved. (3F, 3W, 3Sp, 3Su.)

Staff

Department of

Audiology-Speech Pathology

HEAD: JAY R. JENSEN, Associate Professor; PhD, University of Wisconsin
OFFICE: Mechanical Arts 202

FREDERICK S. BERG, Associate Professor; PhD, Southern Illinois University
RICHARD D. TAYLOR, Associate Professor; PhD, Wayne State University
STEVEN H. VIEHWEG, Assistant Professor; PhD, Northwestern University
THOMAS C. CLARK, Instructor; MS, Gallaudet College
L. JACLYN LITLEDIKE, Instructor; MS, Utah State University
W. JACK FOREMAN, Instructor; MS, Oregon College of Education

The Department of Audiology-Speech Pathology offers a broad program leading to a Master's degree, with undergraduate support, in communication science and disorders. The student may follow either of two avenues to specialization within the department—clinical or experimental. The clinical avenue leads to professional work in three areas with speech and hearing handicapped individuals. These areas are: Speech Pathology, Clinical Audiology, and Educational Audiology. The second avenue leads to a research and experimental career in communication science. The MS degree is available in the four specialization areas. The specialization in Educational Audiology receives cooperative assistance from the departments of Special Education and Elementary Education.

An understanding of communication disorders is best built upon a thorough knowledge of the basic processes of communication. Adequate provision is made in the graduate program at USU to enable students to obtain backgrounds in such subjects as anatomy, physiology, behavioral sciences, and experimental phonetics. Provision is also made to enable students to meet the requirements for their own unique professional aspirations. Therefore, beyond the basic background, each student and his graduate committee plans an individualized course of study.

The demand for specialists in communication science and disorders far exceeds the supply. Numerous opportunities and positions exist in regular and special public schools, rehabilitation centers, hospitals, research laboratories, universities, and many other settings. The student emerging from the graduate program may work pri-

marily with people, with scientific instruments or both. Certification of professional training is available through the American Speech and Hearing Association, and the Utah State Department of Public Instruction.

The Audiology-Speech Pathology program at USU offers excellent opportunities for supervised clinical practicum experience with communicatively handicapped persons in a variety of professional settings. One of these, the USU Speech and Hearing Center, is conducted by the Department. The Center provides a service to the community but is used principally as a clinical laboratory for students. Dynamic up-to-date approaches to clinical training are employed. For instance, a portable television system affords students with self-viewing opportunities and enables them to watch demonstrations of master-clinicians at work. The television system gives instructional experiences which otherwise are difficult or impossible to obtain.

Research Opportunities. A wide variety of research projects concerned with communication processes and communication disorders are being conducted on the Utah State campus. Among those currently being performed by the Audiology-Speech Pathology Department is one in which children of the Intermountain Indian School, located south of Logan, are being studied for deficiencies in communication abilities. Ultimate goal of the study is to provide the information and guidelines necessary for establishing long range hearing and speech programs for Indians throughout the nation.

Another project is that of initiating and developing a statewide infant auditory screening program

in which each infant born in Utah will receive, before leaving the hospital, hearing screening tests at the age of one to four days with intensive and extensive following of those who fail. The program is a joint effort between the University and the Utah State Department of Health and Welfare. The Audiology-Speech Pathology Department is conducting and guiding the program in both its theoretical and practical aspects.

Also concerned with infants is a Departmental project designed to investigate the ontogeny of infant vocalizations. This project will attempt to discover if patterns of learning sounds exists, and if they do exist, how such patterns are structured.

Other studies are being conducted in the areas of hearing aid evaluation, speech discrimination consistency index construction, and sweep frequency audiometer design and construction. At present, the Department of Audiology-Speech Pathology is co-establishing an Interdepartmental Communication Science Laboratory staffed by the Departments of Audiology-Speech Pathology, Electrical Engineering, Psychology, Computer Science, Wildlife, and Animal Science. The laboratory's staff will conduct electroacoustic and electrophysiologic investigations into speech, hearing, and other communicative acts.

Other departments and agencies on campus are also conducting research into communication: Wildlife Department (animal communication), U.S. Office of Agriculture (Teritology).

Assistantships, Fellowships, Traineeships, and Grants. Financial aid for graduate students is available through assistantships, scholar-

ships, undergraduate and summer traineeships, and fellowships. Among sources presently available are the following: University Graduate Assistantship, \$1,000; Robert Shaw Scholarship Award, to \$700; Vera Gee Scholarship Award, to \$500; U.S. Public Health Service (NSDSP) Graduate Traineeships, \$250 per month plus tuition and dependency allowances; Vocational Rehabilitation Graduate Traineeships, \$2400 plus tuition; U. S. Office of Education Graduate Fellowships in the Area of Educational Audiology, \$2,000-\$2,400 plus tuition and dependency allowance. U. S. Office of Education Graduate Fellowships in the Area of Speech and Hearing, \$2,000-\$2,400 plus tuition and dependency allowance; Summer Traineeships, \$75 per week plus tuition; Research Assistantships, stipends varying with qualifications and responsibilities.

The various supports are offered on a competitive basis depending upon grade point average and recommendations from the institution of higher education in which undergraduate work was conducted.

Audiology-Speech Pathology Courses

GRADUATE AND UNDERGRADUATE COURSES

105. *Speech Improvement in the Elementary Classroom.* Designed to provide the teacher with techniques to improve the listening, sound discrimination and production skills of children in the elementary grades. (3Su) Staff

110. *Fundamental Anatomy of Speech and Hearing.* A study of anatomy and physiology of the organs used in speaking and hearing. Emphasis given to developmental considerations. (5W) Fletcher

120. *Speech Pathology I.* Articulation and voice. Introduction to articulatory and phonatory problems—examination, diagnostic and remedial procedures. (5W) Jensen

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125. Speech Pathology II. Study of language and speech problems due to lesions of the nervous system including Cerebral Palsy, Aphasia and other dysarthrias. Prerequisite: A-SP 70, 120 or consent (5Sp) **Jensen**

130. Methods in Speech Therapy. Instruction given in appropriate and effective methods of speech therapy. Special attention paid to the techniques involved in therapy for articulatory errors. Should be taken concurrently with A-SP 135. (2W) **Jensen**

135a. Clinical Practicum—Speech Pathology. Supervised diagnostic and remedial casework with speech handicapped individuals. May be taken more than one quarter. Credit arranged. (F, W, Sp) **Staff**

135b. Clinical Practicum—Audiology. Supervised diagnostic and remedial casework in audiology. May be taken more than one quarter. Credit arranged (F, W, Sp) **Staff**

135c. Clinical Practicum—Educational Audiology. May be taken more than one quarter. Credit arranged. (F, W, Sp) **Staff**

145. Stuttering. Theoretical, clinical and experimental approaches to stuttering and other disorders of speech rhythm. (3Sp) **Jensen**

150. Audiology I. The process of hearing and hearing disorders, and introduction to the field of clinical audiology. (5F) **Taylor**

155. Audiology II. Principles and techniques of audiometric assessment. Prerequisite: A-SP 150. (3W) **Taylor**

160. Audiology III. Advanced theory and practice of audiological evaluation. Prerequisite: A-SP 155. (3Sp) **Taylor**

170. Speech for the Hearing Impaired. Acoustic and spectrographic identification of the speech of individuals with varying hearing impairments; principles, techniques, devices and equipment for developing and correcting the speech of the hearing-impaired; case studies. (3) **Berg**

172. Language for the Hearing Impaired I. Language problems of the hearing impaired. Theories and methods of developing and teaching language. (3W) **Clark**

174. Language for the Hearing Impaired II. Structured language procedures used with children with a severe hearing impairment. Reading problems in relationship to hearing loss. Reading instruction from preschool through high school for hearing impaired children. (3Sp) **Clark**

176. Language for the Hearing Impaired III. Specific methodology in the development of skills in the area of social studies, science,

and arithmetic, demonstrations and tutoring experience-cooperative faculty. (3F) **Clark**

178. The Young Hearing Impaired Child. Problems of teaching hearing impaired children of preschool age; observation and teaching in the preschool department of the Idaho State School for the Deaf. (3F) **Rupert**

180. Dactylogy. A study of manual communications as used by the hearing impaired (Deaf) in America. Fingerspelling, manual signs, natural gestures, and combinations of manual communication with oral communication will be studied. Students will acquire a basic knowledge of the use of manual communications. (2Su) **Clark**

190. Problems in Audiology-Speech Pathology. Selected work, individually assigned, handled and directed. Problems of mutual interest to students and the instructor are investigated and reported upon. Prerequisite: Instructor's consent. Credit arranged. (F, W, Sp) **Staff**

220a. Seminar in Communication Science. Consideration of fundamental science topics pertinent to advanced study in Speech Pathology, Audiology, and Speech and Hearing Science. Prerequisite: Instructor's consent. (2F) **Fletcher**

220b. Seminar in Speech Pathology. Prerequisite: A-SP 125 or instructor's consent. (2F, W, Sp, Su) **Jensen**

220c. Seminar in Audiology. Prerequisite: A-SP 160 or instructor's consent. (2Sp) **Taylor**

220d. Seminar in Educational Audiology. A-SP 125. Credit arranged. 4-8 F, W, Sp) **Staff**

225. Diagnostic Methods in Speech Pathology. Diagnosis and appraisal of speech disorders, including principles and techniques used in case study interview. Prerequisite: A-SP 125. (3W) **Fletcher, Jensen**

230. Medical Background in Speech Pathology and Audiology. Speech and hearing specialists and medical specialists participate jointly in a series of lectures with communication disorders and the multidisciplinary approach to treatment as the common core of concern. Prerequisite: A-SP 120. (4Su) **Staff**

235a. Clinical Practicum—Speech Pathology. Continuation of A-SP 135a. Emphasis given to supervised laboratory experience in analysis, diagnosis, and habilitation of the more complex communication disorders in a variety of clinical settings. Credit arranged. (F, W, Sp) **Staff**

235b. Clinical Practicum—Audiology. Continuation of A-SP 135b. Emphasis given to supervised laboratory experience in analysis, diagnosis, and habilitation of the more complex communication disorders in a variety of clinical settings. Credit arranged. (F, W, Sp) **Staff**

235c. Clinical Practicum—Educational Audiology. Continuation of A-SP 135c. Emphasis given to supervised laboratory experience in analysis, diagnosis and habilitation of the more complex communication disorders in a variety of clinical settings. Credit arranged. (F, W, Sp) **Staff**

240. Public School Clinical Practicum. Supervised diagnostic remedial and casework in public school speech correction. Prerequisite: A-Sp 125. Credit arranged. (4-8F, W, Sp)

250. Experimental Phonetics. (3Sp) **Fletcher**

260. Pediatric Audiology. Special tests and procedures for examining hearing of infants

and small children. Prerequisites: A-SP 150, 155, 160. (3F) **Taylor**

270. Speech Reading. Principles and methods pertaining to optimal use of visual perception by persons with impaired auditory acuity. (3F) **Berg**

275. Auditory Training. Principles and methods pertaining to optimal use of residual hearing by persons with impaired auditory acuity. (3W) **Taylor**

276. Communication Problems of the Hard of Hearing. Covers communication problems associated with hearing deficiencies. (2F) **Berg**

290. Research Studies. Advanced research in Audiology-Speech Pathology Credit arranged. (F, W, Su) **Staff**

295. Thesis. Credit arranged. (F, W, Sp, Su) **Staff**

296. Case Study Thesis. Credit arranged. (F, W, Sp, Su) **Staff**

Department of

English

HEAD: THORNTON Y. BOOTH, Professor; PhD, Stanford University

OFFICE: Library 416

CARLTON F. CULMSEE, Dean, College of Humanities and Arts; Professor of American Civilization; PhD, State University of Iowa; research, teaching for National Chengchi University, Formosa

KING HENDRICKS, Emeritus Professor; PhD, Stanford University; graduate work, University of Berlin

J. LYNN MORTENSEN, Professor; MS, Utah State University; doctoral work, University of Utah

VENETA L. NIELSEN, Professor; MS, Utah State University; advanced study at Columbia University and University of California

JOHN M. PATRICK, Professor; PhD, Georgetown University; post-doctoral work, University of Texas, University of Minnesota, and Chinese Language School

MOYLE Q. RICE, Professor; MA, University of Nebraska; doctoral work, University of Chicago and Harvard University

HUBERT W. SMITH, Professor; PhD, University of Pennsylvania

JOHN J. STEWART, Editor of University Publications and Professor; MS, University of Oregon

KENNETH HUNSAKER, Associate Professor; MS, Utah State University; doctoral work, Pennsylvania State University

REED C. STOCK, Associate Professor; MA, Rutgers University; doctoral work, Rutgers University and Princeton University

- THEODORE ANDRA, Assistant Professor; MS, Utah State University; doctoral work, University of Oregon
- RICHARD J. ANDRE, Assistant Professor; MA, Stanford University
- WILLIAM E. CARIGAN, Assistant Professor; MA and doctoral work, George Washington University
- DELRÆE CHRISTIANSEN, Assistant Professor; PhD, University of Manchester (England)
- ZENNA BETH CROCKETT, Assistant Professor; MS, Utah State University
- H. B. KULKARNI, Assistant Professor; PhD, University of Utah
- THOMAS J. LYON, Assistant Professor; MA, Utah State University; doctoral work, University of California and University of Utah
- DEAN MORGAN, Assistant Professor, PhD, University of Southern California
- MARLAN D. NELSON, Assistant Professor and Assistant to Dean of Humanities and Arts; MA, Stanford University; doctoral work, State University of Iowa
- DON M. RICKS, Assistant Professor; PhD, University of Missouri
- DEAN SKABELUND, Assistant Professor; MS, Utah State University; doctoral work, University of New Mexico

Master of Arts degree. The Department of English offers programs leading to the Master of Arts in English and in American Studies. In each of these fields, two programs are available. The first consists of 45 credits (of which at least 20 credits, exclusive of thesis, must be in courses number above 200, these to include at least three seminars), including a thesis for which either 9 or 10 credits are given. The second program also consists of 45 credits, but instead of a thesis the candidate must complete at least 30 credits of work in the courses numbered above 200, these to include at least four seminars. All candidates take a final oral examination of approximately two hours' duration covering the material of their undergraduate and graduate programs. The focus will be on the thesis for those who have written one.

Only grades of *B* or better will be accepted for credit toward the Master's degree. A *P* (passing) may be given in courses over 200 but must represent *B* or better.

Although it is anticipated that a candidate will be given some choice

in determining his academic program, the Department retains its right to require that individual candidates follow one or the other of these programs, in pursuit of what the Department believes to be the student's interest.

Procedures are as follows:

1. The candidate should file his application for admission to graduate study with the School of Graduate Studies.
2. At his earliest opportunity, the prospective graduate student should consult with the chairman of the departmental Graduate Committee, Dr. Hubert Smith, L460.
3. Before or during the first quarter in residence the candidate must take the Graduate Record Examination, as offered by the School of Graduate studies. On the basis of the score of this examination the candidate may be (i) denied admission to candidacy or (ii) required to do extra course work.
4. The candidate must take a Department-administered preliminary examination in the field of English or American Studies during his first quarter in residence.

Candidates who fail to pass must: (i) wait for six months before taking the examination a second time, and (ii) complete satisfactorily additional course work up to 10 credits as designated by the departmental Graduate Committee.

5. As soon as possible after these tests, candidates will be placed in one of the two programs leading to the degree. The candidate will meet with the chairman of the departmental Graduate Committee to decide upon a major professor and a committee.

6. The candidate must complete the course work outlined by his major professor.

7. All candidates will be required to take English 201. All English majors will be required also to take English 209; American Studies candidates will take at least one of the following: English 162, 205, 209, 261.

8. At least one month before the final oral, the candidate must stand for examination (written or oral, at the discretion of his major professor and his committee) on at least 15 titles chosen by the candidate from a list provided by the Department. At least one title and no more than four will be chosen from each of the five categories. A record of the results of this examination must be filed with the chairman of the departmental Graduate Committee.

9. The candidate must file with the chairman of the Departmental Graduate Committee a letter of language proficiency in the language offered for the degree, from the Department of Languages.

10. Should the candidate be placed in the thesis program, he must present an acceptable thesis which shows adequate research and

writing ability on his part. For this he will receive 9 or 10 quarter credits.

(a) Creative efforts submitted in fulfillment of the thesis requirements must be written under the direction of the candidate's committee, while the candidate is in student status with the Department.

(b) The thesis must be completed within two years after the candidate has completed his residence (course work). If the thesis is not completed, the candidacy may be cancelled, or, under certain extenuating circumstances, more course work may be required.

(c) Copies of the thesis must be deposited as specified in Part III of this catalog.

(d) The candidate must present a brief abstract of the thesis to the School of Graduate Studies.

(e) The candidate must pass a final oral examination conducted by his committee under the auspices of the School of Graduate Studies, in the thesis and the field of the thesis. The candidate will also be expected to display a general acquaintance with major authors, types, and periods in English, American, and world literatures.

11. Should the candidate be placed in the alternative program, he will present added course work in the courses numbered above 200, and prepare for a comprehensive oral examination to be taken in the last quarter of his period in residence.

(a) At least two of the seminar papers must be brought up to thesis standards, in accordance with the *MLA Style Sheet*, and filed with the School of Graduate Studies.

(b) The head of the Department of English will designate the members of the examining committee.

(c) Candidates failing in this examination may be required by the departmental Graduate Committee to complete satisfactorily additional course work before submitting themselves for re-examination.

12. Before the candidate schedules his final oral he must obtain a clearance statement from the chairman of the departmental Graduate Committee signifying that all requirements have been fulfilled.

Master of Arts in American Studies. Candidates for the Master's degree in American Studies are required to present a Bachelor's degree with American Studies, English, History, or Political Science as a major. The course of study will be arranged in consultation with a member of the American Studies Committee and is subject to approval by the chairman of the Committee. The emphasis in graduate work will be largely governed by (a) the student's cultural and professional objectives and (b) his undergraduate course work.

Total credit and examination requirements are in general the same as those for the Master's degree in English. However, the departmental qualifying examination will be administered by the American Studies Committee and will cover primarily American Literature, American History and American Political Institutions.

A selection of the following courses may be applied toward satisfying requirements for the Master's degree in American Studies: English 142, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 201, 251, 252, and 253; History 142, 143, 144, 145, 146, 147, 155, 171, 203, and 224; Political Science 101, 117, 118, 119, 125, 127, 140, 180, 181, 182, 201, 207, 208, and 209.

As many as ten credits may also be drawn from upper division courses in the following subject matter fields: English and Comparative Literature, English and World History, Philosophy, Art, Music, Sociology, and Economics. All students must take at least one of the following: English 162, 205, 209, 261.

In American Studies (as in the regular English program) the student may elect an alternate plan which requires a minimum of 45 credit hours of which at least 30 must be in courses numbered above 200.

Assistantships. Some assistantships are available for students who qualify as Master's candidates in the English department. Interested students should make formal application to the Head of the English Department.

English Courses

GRADUATE AND UNDERGRADUATE COURSES

117. *Creative Writing.*
 (a) Short Stories. (3) Rice
 (b) Essays. (3) Rice, Culmsee
 (c) Poetry. (3) Nielsen
132. *Twentieth-Century Poetry.* An analytical approach to techniques, traditional and modern, and major thought currents of the poetry expressing the twentieth-century relation to backgrounds both old and new. (3) Nielsen
134. *Literary Criticism.* An analytical rather than historical approach to criticism, intended to deepen the student's insight into the nature and purpose of the forms of literature, and to develop literary taste and judgment. (4) Patrick
137. *English Novel, 18th-Century.* A study of the major English novelists of the eighteenth century. (3) Christiansen
138. *English Novel, 19th-Century.* A study of the major English novelists of the nineteenth century. (3) Booth, Christiansen
139. *Twentieth-Century Novel.* A study of major 20th-century novelists. (3) Christiansen

140. **Greek Literature.** Masterpieces of Greek literature, with emphasis upon drama. All readings in English translations. (5) **Stock**

141. **Roman Literature.** A study of selected major literary contributions of the Romans. All readings in English translation. (3) **Stock**

142. **The Bible as Literature.** A survey of the major writings from the Hebrew tradition in the King James Version of the Old Testament, the Apocrypha, and the New Testament. (5) **Staff**

147. **Comparative Literature.** The Eighteenth Century in France and England. (3) **Staff**

148. **Comparative Literature.** The Romantic Period in England and Germany. (3) **Patrick**

149. **Comparative Literature.** The Nineteenth Century in England and Europe. (3) **Hendricks**

150. **American Poetry.** From Philip Freneau to the present. (3) **H. Smith**

151. **American Fiction.** Nineteenth and early twentieth-century fiction writers. (3) **H. Smith, Culmsee, Hunsaker**

152. **American Drama.** Historical treatment of American drama: extensive reading of representative plays. (3) **H. Smith**

153. **Western American Literature.** Literature of the trans-Mississippi West, from the early explorers through the period of settlement. Background material from early journals and official records will be examined. The principal emphasis of the course will be on the novels and short stories depicting the explorers, mountain men, miners, cattlemen, and homesteaders. (3) **Lyon**

154. **Readings in Individual American Authors.** Each course in this series involves a comprehensive reading of one author and a high-level understanding of his content and style. There is no prerequisite. (a) Thoreau, (b) Whitman, (c) Twain, (d) O'Neill, (e) Faulkner, (f) Hemingway, (g) Jack London. (2) **Staff**

155. **The Colonial Period in American Literature.** An introduction to germinal ideas of American thought and institutions as formulated by the Puritans and other writers of the period. (3) **Staff**

156. **The Age of Reason in American Literature.** Eighteenth-century American writing, with particular emphasis on the impact of deism on literary, political, and religious thought. Concentration on such writers as Mayhew, Wise, Edwards, Franklin, Jefferson, Paine, Freneau, Brackenridge, Tyler, and Rush. (3) **H. Smith**

157. **The American Literary Renaissance.** The rise of social, political, and religious liberalism and idealism as reflected by authors from Irving to Whitman, with special emphasis on the transcendentalist movement. (3) **H. Smith**

158. **Realism and Modernism in American Literature.** The turn late in the nineteenth century to realism and naturalism in the works of Twain, Howells, James, Crane, Norris, Garland, and Dreiser. Twentieth-century literature as a reflection of social, economic, and political issues growing out of America's industrialization and role of world dominance. (3) **H. Smith**

159. **Critical Studies of Individual American Authors.** Each course is an intensive study of the major works of one author with special concern given to matters of text, bibliography, and significant critical writings about the author's work. Open only to upper-division and graduate English majors and to others by consent of the instructor. (a) Emerson, (b) Hawthorne, (c) Melville, (d) James. (2) **Staff**

162. **Chaucer** (5) **Hendricks**

163. **Shakespeare.** Comedies and History Plays. (5) **Patrick, Ricks**

164. **Shakespeare.** The Tragedies. (5) **Patrick, Ricks**

165. **Readings in Individual English Authors.** No prerequisite. (a) Wordsworth, (b) Byron, (c) Shelley, (d) Tennyson, (e) Browning, (f) Hardy. (2) **Staff**

166. **Medieval English Literature.** A study of English literature from the beginnings to the Renaissance. The earlier work that presents a linguistic difficulty will be studied in translation. (5) **Ricks**

167. **Critical Studies of Individual English Authors.** Each course is an intensive study of the major works of one author with special concern given to matters of text, bibliography, and significant critical writings about the author's work. Open only to upper-division and graduate English majors and to others by consent of the instructor. (a) Donne, (b) Dryden, (c) Swift, (d) Arnold. (2) **Staff**

168. **English and European Drama, Medieval to 19th Century.** (5) **Morgan**

169. **Modern Drama.** Ibsen to the present. (5) **Booth**

170. **Milton.** (3) **Rice, Stock**

171. **The English Renaissance.** A study of English Literature of the sixteenth century and its continental backgrounds. (5) **Ricks**

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175. **Seventeenth-Century Literature.** (5) Stock

180. **Eighteenth-Century Literature.** (5) Skabelund

190. **The Romantic Period.** (5) Patrick

191. **The Victorian Period.** (5) Booth, Christiansen

199. **Readings and Conference.** Credit arranged. Any quarter. Students must have the approval of the head of the department. Staff

GRADUATE COURSES

200. **Thesis.** Credit arranged. Staff

201. **Bibliography and Methods.** Required of all candidates for Master's degree in English. (3) Staff

202. **A, B, C. Problems in Teaching Freshman English.** A course designed to help the graduate assistants meet the actual classroom problems in Basic Communications. Required of all teaching assistants. (1F, 1W, 1Sp) Staff

205. **History of the English Language.** (3) Hendricks

209. **Anglo-Saxon.** Required of all candidates for the Master's degree. (5) Hendricks

234. **Seminar in Modern Criticism.** Critical theories and methods of significant twentieth-century English and American literary critics, including T. S. Eliot, I. A. Richards, Cleanth Brooks, R. P. Warren, William Empson, Kenneth Burke, and others. (3) Patrick

251. **Seminar: Early American Literature.** (a) The Puritan Mind, (b) The Impact of Deism, (c) Democracy and Religious Diversity. (3) Staff

252. **Seminar: Nineteenth-Century American Literature.** (a) The New England Circle, (b) Romanticism and Regionalism: Mid-Atlantic, South, Frontier, (c) The Rise of Realism and Naturalism. (3) Staff

253. **Seminar: Twentieth-Century American Literature.** (a) Modern Poetic and Critical Schools, (b) Modern Fiction and Drama, (c) Influences of Modern Science and Philosophy. (3) Staff

261. **Reading of Middle English.** (3) Hendricks

265. **Seminar in English Authors.** (a) Bacon, (b) Spenser, (c) Marlowe and Jonson. (3) Staff

271. **Seminar in the English Renaissance.** (3) Ricks

275. **Seminar in Seventeenth-Century Literature.** (3) Ricks

280. **Seminar in Eighteenth-Century Literature.** (3) Staff

290. **Seminar in Late English Literature.** (a) Romantic Period, (b) Victorian Period, (c) The 20th Century. (3) Staff

299. **Independent Study.** Independent study with credit arranged. Open only to graduate students in English. (1-5F, W, Sp) Staff

400. **Continuing Graduate Advisement.** Graduate students who have received maximum thesis credit, but who have not completed the thesis or dissertation, must enroll for a minimum of three credits, until the degree is completed. If the student does not comply, his candidacy may be suspended and his supervisory committee dissolved. (3F, 3W, 3Sp, 3Su.) Staff

Department of

Landscape Architecture and Environmental Planning

HEAD: BURTON TAYLOR, Professor; MLA, Harvard Graduate School of Design

OFFICE Main 1

LAVAL S. MORRIS, Emeritus Professor; MLA, Harvard University

JON ANDERSON, Assistant Professor; BPA, Art Center School; MFA, Utah State University

MALCOLM BISHOP, Assistant Professor; MLA, University of Michigan
CRAIG JOHNSON, Assistant Professor; MLA, University of Illinois
DERLE J. THORPE, Assistant Professor; MS, Utah State University
BERNARD J. WESENBERG, Assistant Professor, PhD, University of Wisconsin
VERN J. BUDGE, Instructor; MLA, University of Illinois
DAVID KOTTER, Instructor; MLA, University of Illinois
ROGER KEITH, Graphics Lecturer; New York School of Visual Arts
Visiting Critics: BURTCH BEALL, AIA; OWEN BURNHAM, AIP; LEON FREHNER, ASLA; KARSTEN HANSEN, ASLA; GERALD KESSLER, ASLA; KENJII SHIOZAUD, ASLA; GARRET ECKBO, ASLA; *Visiting Professors:* DONALD WALKER, MLA; RICHARD TOTH, MLA.

The Department of Landscape Architecture and Environmental Planning of Utah State University is accredited by the American Society of Landscape Architects.

Holders of the Bachelor degree in allied fields may become candidates for the Master of Science or Master of Landscape Architecture, if they satisfactorily complete, or have completed, a minimum of 45 hours' credit in Landscape Architecture at the upper division level.

The level at which students enter the graduate program will be determined by an evaluation of their past background and experience.

The MLA degree is a professional terminal degree in Landscape Architecture as established by the American Society of Landscape Architects. It constitutes a one and one-half to two-year program, including 60 credits in the 200 and 300 level series courses. Special problems in the second year graduate studio in the 300 course level are assigned to the student on an individual basis. Certain upper division and graduate courses are required in allied fields.

The MS degree in Environmental Planning encompasses a broader approach to design problems. The graduate degree program is sufficiently flexible to meet the needs of individuals engaged in the various phases of Planning. The candi-

date is given assistance in planning an academic program which will provide cultural and professional development in his chosen field.

A thesis of 10 to 15 hours of credit is required, the precise hours being determined jointly by the candidate and the faculty, depending upon the complexity and scope of the chosen subject.

Any deficiencies must be made up before a student may be advanced to candidacy. The degree is awarded only when the candidate's over-all record, including course work, required examinations, the MS thesis or MLA thesis, represent considerable accomplishment.

Landscape Architecture and Environmental Planning Courses

GRADUATE AND UNDERGRADUATE COURSES

130. **Park and Recreational Planning.** Analysis and development procedures in national, state and urban parks, forest lands, and private lands in terms of recreational and aesthetic values and uses. (3Sp) **Staff**

135. **Travel Course.** A major field trip to examine a variety of projects in planning and design. Students are required to take this course at least once during their training. Credit arranged. (Su) **Staff**

140, 141, 142. **Landscape Design.** Introduction to the analysis and writing of design criteria and the design procedure for private and public land planning projects. Theoretical and actual site problems are used. Prerequisites: LA 62 and CE 82. (4F, W, Sp)

Bishop

164 College of Humanities and Arts

150, 151, 152. **Planting Design.** Pictorial compositions and planting plans developed together. Designed to develop ability in visualizing the completed landscape development. (3F, W, Sp) **Johnson**

160, 161, 162. **Landscape Construction.** Master construction plans, grading, drainage, structure, cost estimates, and specifications. (3F, W, Sp) **Baron**

170. **City and Regional Planning.** An introduction to the procedures and methods of city and regional planning. Legislative, administrative, and effectuation of the general comprehensive plan. The physical design aspects of town and city are analyzed. (3W) **Taylor**

180, 181, 182. **Advanced Planning and Design.** Urban design, subdivisions, housing projects, public grounds, parks, cemeteries, building groups, recreational areas, and communities on various types of topography. (4F, W, Sp) **Taylor**

190. **Special Problems.** Selected problems to meet individual needs in completing the professional training. Registration by permission only. Credit arranged. (F, W, Sp, Su) **Staff**

195. **Readings and Reports on Current Topics and Trends in LAEP.** Also covers contracts, specifications, professional ethics, and office practice. (1W, 1Sp) **Taylor**

GRADUATE COURSES

210, 211, 212. **Landscape Architecture.** A series of complex problems of variable subject matter adjusted to fit the individual needs of each student and designed to emphasize the various phases of landscape architecture such as landscape design, surveying and construction, architecture and city planning, plant materials and planting design, contracts and specifications, drafting and delineation, cost estimating and reports. Credit arranged. (F, W, Sp) **Bishop**

220. **Thesis.** Subject matter of thesis will be determined by the student in consultation with the staff. The actual accomplishments of the thesis will be a matter of making plans and supplementary drawings necessary for the actual accomplishment of a major problem in Land Design and Development. Written material will be required in the form of a statement of the problem; a basis of design consisting of justification, specification and any other supplementary material required. Credit arranged. (F, W, Sp, Su) **Staff**

310, 311, 312. **Landscape Architecture.** This series covers advanced design planning construction and office procedures and practices as an integrated unit. The series is designed for students pursuing the professional MLA degree. Credit arranged. (F, W, Sp) **Taylor**

316. **Professional Practice.** Graduate readings and reports on current topics and trends in Landscape Architecture and Environmental Planning. The seminar also covers contracts, specifications, professional ethics, and office practice. (1F, 1W, 1Sp) **Taylor**

320. **Thesis.** Subject matter of the terminal degree thesis will be determined by the student in consultation with the staff. The actual accomplishment of the thesis will be a matter of making plans and supplementary drawing necessary to the actual accomplishment of a major problem in Land Design and Development. Written material will be required in the form of a statement of the problem; a basis of design consisting of justification, specification, and any other supplementary material required. Credit arranged. (F, W, Sp, Su) **Staff**

400. **Continuing Graduate Advisement.** Graduate students who have received maximum thesis credit, but who have not completed the thesis or dissertation, must enroll for a minimum of three credits, until the degree is completed. If the student does not comply, his candidacy may be suspended and his supervisory committee dissolved. (3F, 3W, 3Sp, 3Su.) **Staff**

Department of

Music

HEAD: MAX F. DALBY, Professor; EdD, Utah State University
OFFICE Fine Arts Center 107

A. L. DITTMER, Professor; PhD, Eastman School of Music, University of Rochester

IRVING WASSERMANN, Professor; ML, University of Cracov, Poland

RALPH MATESKY, Associate Professor; MM, University of Southern California
 WILLIAM H. RAMSEY, Associate Professor; EdD, Columbia University
 WARREN BURTON, Assistant Professor; MS, Utah State University
 LARRY SMITH, Assistant Professor; MS, Utah State University
 ALVIN WARDLE, Assistant Professor; MED, Utah State University

Qualified graduates from accredited degree-granting institutions in Music may be admitted as candidates for graduate degrees in Music.

Two different degrees are offered: Master of Music and Master of Arts. The Master of Arts degree requires two years of foreign language study. For each degree, the student may select courses of study leading to (a) a major in Music Education or (b) a major in Applied Music.

Each candidate must successfully complete an examination for admission to the program of graduate study in music. This examination may be taken under the supervision of a proctor at a college or school designated by the University Department of Music and near the candidate's place of residence.

Students may elect a thesis project, a lecture-recital or concert-recital. All work is to be completed under the supervision of a graduate committee. In addition, each student is required to take the graduate record examination before being admitted to candidacy for the Master's degree.

Before being admitted as a candidate, a singer must show acquaintance with solo literature for his voice. His repertory must include:

- a. representative solos for his voice from the standard oratorios;
- b. representative arias for his voice from the standard operas;

c. standard and contemporary solo repertory from Italian, French, German, and American sources.

Requirements leading to the MM and MA follow:

MUSIC EDUCATION

Required:	Credit
Music 258 Seminar in Music Education	3
259 Seminar in Music Theory	2
280 Seminar in Music Literature	3
287 Individual Recital or Thesis (Music 285)	9
Educ 260 History and Philosophy of Educ ..	3
230 Secondary School Curriculum	3
Psy 200 Principles of Learning in Teaching	3

Minor Area: two three-hour upper-division classes in English, history, political science, sociology, or philosophy as recommended by the adviser	6
	33

Electives:

Music 112 Twentieth Century Music	3
201 Intro to Musicology	3
205 Special Problems	3-6
251 Advanced Choral Methods	1
252 Advanced Orchestra Methods	1
255 Band Symposium	3
Individual Instruction	3
Psy 202 Psychology or Adolescence	3
205 Child Psychology and Development	3
	12
	45 Credits

APPLIED MUSIC

Required:	Credit
Music 112 Twentieth Century Music	3
205 Special Problems	6
258 Seminar in Music Education	3
259 Seminar in Music Theory	3
280 Seminar in Music Literature	3
287 Individual Recital	9
201 Intro. to Musicology	3
Performing Group participation	3
Individual Instruction	6

Minor Area:

Two three-credit upper-division classes in English, history, political science, sociology, or philosophy as recommended by the adviser 6

45 credits

Music Courses**GRADUATE AND UNDERGRADUATE COURSES****101, 102, 103. Music History and Literature.**

Basic course for music majors and those desiring a comprehensive background in music. Stresses music in general culture, the place of music in history, and the relationship of music to the other arts. Fall quarter covers the period from antiquity through the Baroque; Winter quarter, Classicism and Romanticism; Spring, contemporary music. Required of all music majors. Prerequisite: Music 2 or 6. (3F, 3W, 3Sp) **Wassermann**

104, 105, 106. Advanced Theory. Continuation of Beginning Theory. Includes advanced sight singing, keyboard modulation, and introductory counterpoint. (3F, 3W, 3Sp) **Dittmer**

107. Scoring and Arranging. Theoretical and practical study of scoring for wind, string, and percussion instruments in various combinations, ranging from small ensembles to the concert band and symphony orchestra. (3W) **Smith**

***108, 109, 110. Counterpoint.** Strict counterpoint in all species in two, three, and four or more parts. Creative writing. Combined forms; double and triple with free parts. (3F, 3W, 3Sp) **Dittmer**

112. Twentieth Century Music. An intensive survey of the significant techniques, forms, and styles in the music of our time. Analysis of a variety of scores and recordings. Works of criticism evaluating recent developments and statements by composers discussing their philosophy and aims are studied. Prerequisite: Music 2 or equivalent. (3 Sp, 3 Su) **Wassermann, Staff**

***114, 115, 116. Composition.** Projects in creative composition in the smaller forms, including solo and ensemble compositions. Prerequisites: Music 106, 107. (3F, 3W, 3Sp) **Dittmer**

124. Chamber Orchestra. The preparation and performance of music for chamber orchestra and opera. May be repeated for credit. Admission by audition. (1F, 1W, 1Sp, 1Su) **R. Matesky**

***129. Stage Band Workshop.** Practicum for Music and Music Education majors; study of the contemporary idiom of the high school

dance band; analysis of harmonic structure and ear training in chordal progressions and improvisation. Prerequisite: Music 106 (3Sp) **Smith**

135. Opera Staging and Production. Musical and theatrical techniques for the singing actor, pianist-coach, and music-theatre director. Performances of scenes, one-act operas, and at least one major production during year. Audition required for singers and pianists. (1-3F, 1-3W, 1-3Sp, 1-3Su) **Ramsey**

138. Readings in Choral Literature. Provides an opportunity for majors in Music Education with the vocal concentrate to become familiar with materials suitable for performance by high school choral groups. (1F, 1W, 1Sp) **Ramsey**

140. Choral Conducting. Fundamentals of baton technique and interpretation of the musical score. Assigned projects in conducting small and large vocal ensembles. (3F) **Ramsey**

141. Instrumental Conducting. Basic rehearsal procedures for realization of musical values. Assigned projects in conducting small and large instrumental ensembles. (3W) **Dalby**

149. Music for the Secondary Schools. A study of the music program for the non-specializing teenager, dealing with his emotional and vocal problems, and with methods for introducing singing, playing musical instruments, hearing, reading and creating music. (3Sp, 3Su) **Dittmer, Staff**

150. Music for Elementary Schools. Development of the classroom music program. Problems, methods, and materials in singing, rhythms, creative music, reading and listening. (3F, 3W, 3Sp, 3Su) **Burton**

151. Secondary School Choral Methods and Materials. Teaching and administration of various phases of the choral music program. (3F) **Ransey**

153. Secondary School Instrumental Methods and Materials. Teaching and administration of various phases of the instrumental music program. (3Sp) **Dalby, Staff**

155. Piano Teaching Methods. Designed to prepare qualified pianists to teach piano effectively and to acquaint them with new materials and techniques. Problems common to all piano teaching and teacher-student relationships are analyzed. (1Sp) **Wassermann, Staff**

*Taught 1968-69

**Taught 1969-70

156, 157, 158. **Vocal Repertory.** A study of English, Italian, and French vocal literature as well as German Lied and contemporary song literature, through performance; concentration is on diction, interpretation, and style. (2F, 2W, 2Sp) **Dittmer**

163. **Piano Workshop.** An intensive course for advanced piano students and piano teachers. Includes lectures on basic harmony, piano techniques, memorization, building repertoire and teaching materials. (1Su) **Wassermann**

GRADUATE COURSES

201. **Introduction to Musicology.** A survey of the fields, systematic and historical, of musical knowledge and research. (3W) **Dittmer, Staff**

205. **Special Problems in Music.** An advanced course designed to meet specific problems of the music educator and the applied music specialist. (1-3F, 1-3W, 1-3Sp, 1-3Su) **Staff**

235. **Opera Workshop (Advanced)** Designed for the advanced singer, conductor-coach and director. Directors will be assigned scenes and one-act operas to direct. Conductor-coaches will prepare and perform scenes and assist with major productions. Advanced singers will perform scenes and leading roles in major productions. Admission by audition. (1-3F, 1-3W, 1-3Sp, 1-3Su) **Ramsey**

251. **Advanced Choral Methods.** Rehearsal techniques and materials for the secondary school choir. The study of phonetics as it relates to choral sound. Teachers registering for this class are expected to sing in clinic chorus. Daily during Summer Music Clinic. (1Su) **Staff**

252. **Advanced Orchestra Methods.** Techniques in training the school orchestra. Consideration of special problems relating to the string instruments. Teachers registering for this class are expected to play in the clinic orchestra. Daily during Summer Music Clinic. (1Su) **Staff**

255. **Band Symposium.** An intensive review of rehearsal procedures and conducting techniques. Survey of new materials; analysis of performance. Wind and percussion clinics. Private consultation on special problems. Nationally known authorities serve with resident staff. Five hours, daily, first week of Summer School. (3Su) **Staff**

258. **Seminar in Music Education.** Basic concepts in Music Education. A study of musical behavior and the scientific bases for human responses to musical stimuli. (3W, 3Su) **Staff**

259. **Seminar in Music Theory.** A study of the practical aspects of musical theory as related to analysis, pedagogy and composition. (3F, 3Su) **Staff**

280. **Seminar in Music Literature.** An advanced course for graduate students. Designed to study the development of Western music from Monody to the twentieth century through analysis of its form and structure and through an investigation of all available literature. (3Sp, 3Su) **Staff**

285. **Research and Thesis.** Individual work in thesis writing with guidance and criticism. Credit arranged. (F, W, Sp, Su) **Staff**

287. **Individual Recital.** The preparation and presentation of a graduate recital. Supervision by the major professor. Credit arranged. (F, W, Sp, Su) **Staff**

400. **Continuing Graduate Advisement.** Graduate students who have received maximum thesis credit, but who have not completed the thesis or dissertation, must enroll for a minimum of three credits, until the degree is completed. If the student does not comply, his candidacy may be suspended and his supervisory committee dissolved. (3F, 3W, 3Sp, 3Su.) **Staff**

Department of

Speech

HEAD: REX E. ROBINSON, PhD. University of Wisconsin
OFFICE Main 33

BURRELL F. HANSEN, Professor; Chairman, Radio and Television; Coordinator of Broadcasting; PhD, University of Minnesota; certificate, Stanford Television Institute

W. RONALD ROSS, Assistant Professor; MFA, University of Utah

The Department of Speech offers a Master of Science degree and the Master of Arts degree in the following fields: Interpretation, Public Address, and Broadcasting.

Graduate students taking speech courses in the 100 series, usually taken by upper division students, will be expected to present additional projects at the option of the instructor.

Speech Courses

GRADUATE AND UNDERGRADUATE COURSES

107. Speech Improvement in the Elementary Classroom. Designed to provide the teacher with techniques to improve the speaking skills of normal children in the elementary grades. (3Su) **Staff**

****109. Discussion and Conference Leadership.** Application of various group discussion techniques to current problems. Workshop procedures offer practice in preparation, use and evaluation of methods. (3W, Sp) **Robinson**

110. Play Reading. Attention given to cutting and building for public programs. (3Sp) **Staff**

111. Psychology and Semantics of Speech. Principles of psychology which underlie speech. Personal adjustment through speech. An insight into the process of symbol use. (3F) **Staff**

123. Teaching of Speech. Methods and problems peculiar to teaching of speech both in secondary schools and in speech areas for Basic Communications work in the University and in basic speech courses at the college level. Organization of courses and lesson plans included. Prerequisite: Instructor's consent. (3Sp) **Staff**

124. Advanced Interpretation. The mastering of significant selections from great writers. Reading from manuscript and from memory. (5F, W) **Ross**

125. Speech Composition. Advanced theory and practice of public speaking. Building and delivering several short speeches and reading selected masterpieces from the world's public speaking literature. Prerequisites: Sophomore standing and Speech 1, or English 1, 2, 3. (5W, Sp) **Robinson**

133. Directing Forensic Programs. Consideration of the philosophy underlying forensic activities, the values of various team and

individual events, the methods of preparing students for participation in them, and the direction of forensic tournaments. (3Su)

Robinson

181. Television Production. The production and direction of television programs: developing programs, casting and rehearsal procedures, and coordination of technical aspects. Prerequisite: Speech 83 or instructor's permission. To be taken concurrently with Journalism 184. (3F) **Hansen**

184. Educational Broadcasting. Projects in developing and producing educational radio and television programs for in-school or broadcast use. Methods in effective utilization in the classroom of televised materials. (3W) **Hansen**

185. Advanced Radio-TV Production. Principles and projects in television directing. Methods for meeting specialized problems in production of radio and television programs. Prerequisite: Speech 181. Credit arranged. (W) **Hansen**

186. Radio and Television Training. Enrollment limited to students qualified by training and ability for actual broadcasting experience in a station. An apprenticeship under direction of the station staff in executing duties expected of a regular staff employee. Students render three hours' broadcasting service per week, for each hour of credit. Time and credit arranged. (Total limited to 6 credits) (1 to 5F, W, Sp) **Hansen**

190. Problems in Speech. Selected work, individually assigned, handled and directed. Speech problems of mutual interest to student and the instructor are investigated and reported upon. Prerequisite: Instructor's consent. Credit arranged. (F, W, Sp) **Staff**

GRADUATE COURSES

201. Thesis. (2-5F, W, Sp) **Staff**

224. Seminar in Oral Interpretation. Study of the history of oral interpretation; approaches of texts and leaders to theory in oral interpretation. (2F) **Ross**

225. Seminar in Rhetorical Theory. Classical backgrounds in rhetorical theory with modifications of more recent rhetoricians. (2W) **Robinson**

230. Seminar in Radio and Television. The literature and research on the uses of radio and television as media of communication and as instruments of social action. (2F, W, Sp) **Hansen**

****Taught 1969-70**

400. **Continuing Graduate Advisement.** Graduate students who have received maximum thesis credit, but who have not completed the thesis or dissertation, must enroll for a mini-

mum of three credits, until the degree is completed. If the student does not comply, his candidacy may be suspended and his supervisory committee dissolved. (3F, 3W, 3Sp, 3Su.)
Staff

Department of

Theatre Arts

ACTING HEAD: TWAIN C. TIPPETTS, Professor and Coordinator of Fine Arts; EdD, University of California at Los Angeles

OFFICE: Fine Arts Center 232

FLOYD T. MORGAN, Professor; MA, State University of Iowa; doctoral work, State University of Iowa and Stanford University

W. VOSCO CALL, Associate Professor; MA, University of Washington

LEROY C. BRANDT, JR., Assistant Professor; MFA, Boston University

Theatre Arts offers advanced work leading to the Master of Arts and Master of Fine Arts degrees. The graduate program in Theatre Arts prepares the student for work in educational and nonprofessional theatres. It offers training and experience in playwriting, directing, acting, designing and advanced technical practice.

During the first quarter of residence, and before admission to candidacy for either the Master of Arts or the Master of Fine Arts degree, the candidate is required to take the Graduate Record Examination given by the School of Graduate Studies and two diagnostic and program planning examinations given by the Theatre Arts staff. The first of these is a comprehensive written examination covering theatre history, literature and criticism, acting, directing, scenery and costume design, lighting, make-up, technical practice, current drama and theatre. The second examination is an oral skills test in which the student demonstrates before a Departmental com-

mittee his competency in voice and diction, extemporaneous speaking, and interpretative reading or acting. The results of these examinations are used to assist the student and his faculty adviser in planning a program of study and in selecting a thesis subject or creative project.

Candidates for the Master of Arts degree are required to present from the Department of Languages a statement of proficiency in reading one foreign language. The language should be one taught regularly at USU.

The candidate for the Master of Arts degree may, with the approval of his supervisory committee, present a thesis or a thesis alternate. The candidate for the Master of Fine Arts degree presents a creative project in playwriting, directing, acting, scene, costume, lighting, design or advanced technical practice. As part of the creative project and in lieu of a thesis this candidate submits an original long play or its equivalent, a production book or a project portfolio.

Theatre Arts Courses

GRADUATE AND UNDERGRADUATE COURSES

100, 102, 104. History of Theatre and Drama. A survey course correlating theatrical history and drama from ancient times to the present. Fall: Classic, Oriental, and Medieval; Winter: Early Renaissance through Eighteenth Century; Spring: Nineteenth Century to the present. (4F, 4W, 4Sp) **Staff**

106. Current Drama. Reading and discussion of selected plays of modern day playwrights: O'Neill, Shaw, Anderson, Miller, Williams, Inge, Ionesco, Beckett, Albre, et al. (3Sp) **Morgan**

120. Fundamentals of Design for the Theatre. Basic design principles applied to designing for the theatre. Projects in sketching, rendering, drafting, perspective, model making, scene painting techniques. Prerequisite to THART 150, 153, 154, 192, and to advanced production and design projects. (2F) **Morgan, Perkes**

124. Theatre Practice. Application of basic theatre production practices. Supervised rehearsals, performances, crew and staff work. (1F, W, Sp, Su) **Staff**

144. Advanced Acting. Emphasis on the creative approach to acting, analysis and creation of the role and ensemble playing (3Sp) **Call**

146. Directing. Theory and practice of the principles of stage directing. (3Sp) **Call**

148. Private Instruction. Individual tutoring to develop competence in voice, acting, directing, scenic and costume design. Special fee. Credit arranged. (F, W, Sp, Su) **Staff**

150. Scene Design. Application of basic principles of design to the stage setting. Development of scenic designs through color sketches, plans and models. Practice in scene painting techniques. Survey of the history of stage decoration. Prerequisite: THART 120 or consent of instructor. (3W) **Morgan**

151. Historic Costume for the Stage. Historical survey of the development of costume from the Egyptians to the 1900's, with a practical approach to the reproduction for stage use of each period, as well as a study of the manners of the period. (3F) **Perkes**

152. Stage Costuming. Fundamentals of pattern drafting, construction of stage costumes and accessories, organization and care of costume wardrobes. (3W) **Perkes**

153. Costume Design. Theory and practice in the design and selection of costumes for non-realistic, historical and modern plays. Relationship of costume to character and production. Prerequisite: THART 120 or consent of instructor. (3Sp) **Perkes**

154. Stage Lighting. Study and application of the principles of stage lighting. Lighting design, mounting of instruments and operation of control boards. Prerequisites: THART 50 and 120 or consent of instructor. (2W) **Brandt**

156. Theatre Organization and Management. Study of the managerial aspects (organization, promotion, financing) of the educational and community theatres. (2Sp) **Call**

158. Creative Dramatics. Guidance of children in the creation of scenes and plays with improvised dialogue and action. Application of creative dramatics to the classroom situation. Recommended for prospective elementary school teachers. (2Sp) **Call**

160. Playwriting. Analysis of dramatic structure. (3W) **Morgan**

190. Problems in Drama. Selected research problems of merit and of mutual interest to students and instructors are investigated. Credit arranged. (F, W, Sp, Su) **Staff**

192. Projects in Theatre. Advanced work in playwriting, acting, directing, scene design, costume design, makeup, costume construction, lighting, technical practice, and theatre management. Projects may be done in connection with Utah State Theatre productions or they may be independent endeavors. A total of 9 credits may be earned in this course. Registration by consent of instructor. Credit arranged. (F, W, Sp, Su) **Staff**

194. Problems of Drama Directors. Play selection, organization of the production, drama club activities, simplification of settings, lighting, costumes, financing, auditorium and stage facilities, central staging, audio-visual aids, and bibliography are studied. Recommended for directors and prospective directors of high school, church, and community theatres. (3Sp) **Morgan**

196. Advanced Directing. Practice in stage direction. The student selects, casts, directs, and presents short plays and scenes. Prerequisite: THART 146. (3W) **Call**

GRADUATE COURSES

200. Seminar in Drama. Intensive study of special problems in drama and theatre. Credit arranged. (F, W, Sp, Su) **Staff**

201. Dramatic Theory and Criticism. Beginning with Aristotle's Poetics, the course explores the traditional works of critical theory that relate to the theatrical arts. Prerequisites: THART 100, 102, 104. (3Sp) **Staff**

202. Research Studies. Advanced research in drama and theatre. By permission of instructors. Credit arranged. (F, W, Sp, Su) **Staff**

204. Thesis. Credit arranged. (F, W, Sp, Su) **Staff**

292. Advanced Projects in Theatre. Graduate projects in any branch of theatre art. Credit arranged. (F, W, Sp, Su) **Staff**

400. Continuing Graduate Advisement. Graduate students who have received maximum thesis credit, but who have not completed the thesis or dissertation, must enroll for a minimum of three credits, until the degree is completed. If the student does not comply, his candidacy may be suspended and his supervisory committee dissolved. (3F, 3W, 3Sp, 3Su.) **Staff**

College of**Natural Resources**

DEAN: J. WHITNEY FLOYD, MSF, University of California; graduate work, University of Michigan

OFFICE: Forestry and Zoology 155

Department of**Forest Science**

HEAD: ROSS S. WHALEY, Associate Professor; MS, Colorado State University; doctoral work, University of Michigan

OFFICE: Forestry-Zoology 155

J. WHITNEY FLOYD, Professor and Dean, College of Natural Resources; MSF, University of California; graduate work, University of Michigan

T. W. DANIEL, Professor; PhD, University of California; Fulbright Research Scholar in Austria

RAYMOND R. MOORE, Professor; PhD, University of Washington

JOHN D. HUNT, Associate Professor and Extension Forest Recreation Specialist; MS, University of Idaho; doctoral work, University of Idaho

J. ALAN WAGAR, Associate Research Professor and Leader, Cooperative Recreation Research Unit; PhD, University of Michigan

WENDELL BEARDSLEY, Assistant Research Professor and Assistant Leader, Cooperative Recreation Research Unit; MS, University of Minnesota

RICHARD A. OGLE, Assistant Professor; PhD, Syracuse University

GEORGE E. HART, Assistant Professor; PhD, University of Michigan

CARL M. JOHNSON, Assistant Professor; MS, Utah State University

RONALD LANNER, Assistant Professor; PhD, University of Minnesota

JOHN D. SCHULTZ, Assistant Professor; doctoral work, University of Michigan

Collaborators: NORBERT V. DEBYLE, PhD; RICHARD G. KREBILL, PhD; ROBERT S. JOHNSON, MS; ROBERT D. DOTY, MS

The Department offers the Master of Science and Doctor of Philosophy degrees as professional degrees. The Master of Forestry degree is offered for those students who lack prior academic training in forestry. The Master's degree is granted in the following eight subject areas: forest management, silviculture, forest ecology, forest

recreation, forest hydrology, forest economics, forest protection, and wood science and technology. A thesis is required for the MS and PhD degrees, but the MF may be granted without a thesis.

The degree of Master of Science in Forest Science may be earned by a student who has an undergraduate degree in Forestry, with ac-

ceptable scholarship, upon completion of a prescribed course of study and fulfillment of other requirements listed by the School of Graduate Studies.

The Master of Forestry degree program is available to students possessing a nonforestry Bachelor's degree with acceptable scholarship. The minimum requirements include the completion of 45 credits in the basic sciences of chemistry, physics, mathematics, botany and soils; 42 credits in specified forestry courses; and 10 credits of graduate (200 series) course work. Part of these requirements may have been satisfied during the student's undergraduate course work.

A program of instruction and research leading to the degree of Doctor of Philosophy is offered to a selected number of students.

An applicant for graduate work should submit an official transcript of college courses and an official application for admittance to the Dean of the School of Graduate Studies. Application forms may be obtained at his office.

Graduate assistantships are available to graduate students in Forest Science. Application for assistantships should be made to the head of the Forest Science Department.

Forest Science Courses

GRADUATE AND UNDERGRADUATE COURSES

103. Silviculture and Dendrology. Basic Silvics: Silvicultural systems; western conifers and western regional silviculture; elements of eastern hardwoods and types. Not open to Forest Science majors. Prerequisite: Ecology and Taxonomy. (5W) C. Johnson

106. Forest Measurements I. Measurements of timber in log, tree, and stand; log rules and scaling; statistical methods useful in analyzing forest data; timber cruising practices. Prerequisite: Summer Camp. (4W) Moore

107. Forest Measurements II. Volume and yield table compilation; growth of even-aged, all-aged and residual cutover stands. Prerequisite: Forestry 106. (3Sp) Moore

110. Principles of Conservation. An introduction to conservation problems designed to acquaint one with the nature and extent of the renewable resources of the United States and the methods of conservatively using them. Open to all students except those registered in the College of Natural Resources. (3F, W, Sp, Su) C. Johnson

112. Dendrology I. Hardwoods. Identification, distribution and silvics of the more important forest trees in the United States. (3F) C. Johnson, Schultz

113. Dendrology II. Conifers. Identification, distribution, and silvics of the more important forest trees of the United States. (2W) C. Johnson, Schultz

114. Silviculture I. Characteristics of the tree species which influence silvicultural practice in the United States. Prerequisites: Summer Camp, Range 126, Forestry 112, Botany 120. (3W) Daniel

115. Silviculture II. Silvicultural systems used in securing natural reproduction of forests and their applications to the important species and forest types in the United States. Prerequisite: Forestry 114. (3Sp) Daniel

116. Seeding and Planting. Seed collection, extraction and cleaning methods; germination testing; storage of forest tree seeds; practical experience in field planting and nursery work. Prerequisite: Forestry 115. (2Sp) Daniel

118. Forest Protection I. Prevention, suppression and suppression of forest and range fires, including economic and physical effect; fire behavior, Field trips. (3W) Hart

119. Forest Protection II. Problems of administration and economics in protecting forests from biological enemies. Prerequisites: Forestry 115, 121. (3F) Lanner

120. Silviculture III. Regional silviculture of the United States. Prerequisite: Forestry 115. (3W) Daniel

121. Forest Management. Physical factors influencing the regulation of a forest for sustained yield: site, growing stock and rotation; compilation of data for management plans. Prerequisite: Forestry 107, 115. (4F) Moore

174 College of Natural Resources

122. Forest Valuation. Determination of monetary values in forest growing stock and land. Analysis of alternate management methods by use of standard valuation techniques. Prerequisite: Forestry 121. (4W) **Moore**

123. Forest Economics. Economic problems involved in the utilization of forest land and timber, distribution of forest products, and the management for multiple uses. (5Sp) **Whaley**

125. Logging. Principles and methods of harvesting wood products, with emphasis on cost, values, and the application of forestry to the harvesting process. Prerequisite: Forestry 97. (3F) **Moore**

126. Wood Technology. Structure and identification of the economic woods of the United States. Prerequisite: Forestry 112, 113. (3W) **Staff**

129. Mechanical Properties. Factors affecting the strength of wood. (2W) **Staff**

130. Milling and Products. Manufacturing, grading, seasoning and preserving lumber, including study of the wood-using industries and their products. (3Sp) **Staff**

131. Forest Products Marketing. Principles of marketing applied to lumber and other forest products. (3Sp) **Staff**

132. Forest Administration and Policy. A study of forest administration, organization, policy formation and personnel management. The development of forest and conservation policy and its effects on current forestry practices. (3F) **Ogle**

134. Aerial Photo Interpretation. Elements of photogrammetry; use of aerial photographs in mapping vegetation types and estimating timber volumes, construction of planimetric maps from aerial photographs. (3F, W) **Ogle**

137. Recreational Use of Wildland. Consideration of the factors responsible for recreational use, legislative programs, philosophical concepts, and descriptions of recreation agencies involved in wildland recreation management. (3F) **Hunt, Ogle**

138. Regional Recreation Planning. Land classification and economics of various forms of forest recreational use. (2Sp) **Whaley**

139. Interpretive Planning. The analysis and development of interpretive programs for recreational areas. Techniques of natural history interpretation. Evaluation and planning of visitor information programs. (3W) **Hunt**

140. Forest Recreation Management. Factors influencing the management of forest recreation sites. Consideration of land management objectives, alternative methods of development, regulations, and user satisfaction. (3Sp) **Floyd, Hunt**

145. Forest Problems. Individual study and research upon a selected forestry problem approved by the instructor. (1-3F, W, Sp) **Staff**

146. Junior Field Problems. Study of forest operations. Junior year. Fee \$50 (1Sp) **Staff**

190. Watershed Instrumentation. Application of data collection devices and systems to measurements of wildland watershed parameters. Includes experience in installation and operation of hydro-meteorologic equipment and discussion of techniques for interpretation and analysis of data. Prerequisites: Range Science 180 or permission of instructor. Two lectures, one lab. (3S) **Hart, Schultz**

191. Forest & Range Hydrology. The role of forest and range vegetation in determining the hydrologic function of a watershed; natural storage phenomena of the forest land surface and methods of modifying this. Prerequisites: Range 126, 180, For. 115. (4Sp) **Hart**

GRADUATE COURSES

201. Forest Management Seminar. Review and discussion of current literature and developments in Forest Management. (1F) **Whaley**

202. Forest Watershed Seminar. Review and discussion of current literature and developments in Forest Watershed Management. (1W) **Schultz**

203. Forest Recreation Seminar. Review and discussion of current literature and developments in Forest Recreation. (1Sp) **Hunt**

204. Forest Ecology. Study of past and present distribution of forest species and forest types and the physical-biological basis of distribution and growth performance. (3W) **Staff**

205. Silviculture. Intensive study of a particular region by individual students. Group work consists of advanced treatment of silvics and silviculture, with emphasis on physiological aspects of both subjects. (3F, W, Sp) **Daniel**

206. Forest Management. Individual study projects within the fields of forest measurements, valuation, regulation, organization, and development of forest properties. (2F, W, Sp) **Moore**

207. Forest Protection. Advanced study in specialized fields of forest protection. (2W)
Hart, Lanner

208. Forest Watershed Management. Individual study projects within the field of forest watershed management. (2F, W, Sp) **Schultz**

209. Forest Economics. Advanced work in the economics of forestry. Particular attention is given to the application of economic theory to solving present-day problems in the multiple use of forest lands and in the production and distribution of forest products. (2F, W, Sp) **Whaley**

210. Forest Recreation. Individual study projects within the field of forest recreation. (2F, W, Sp) **Floyd, Hunt, Ogle**

211. Thesis. Original research on a problem in Forest Management, to be concluded by preparation of a thesis. (10-15F, W, Sp) **Staff**

212. Forest Utilization. Individual study projects within the field of forest utilization. (2F, W, Sp) **Staff**

213. Forest Ecology Problems. Individual problem work in specialized aspects of forest ecology. (2F, W, Sp) **Staff**

215. Tree Improvement and Forest Genetics. Forest tree improvement through selective

breeding and the testing techniques and problems of applying the principles of genetics to forest trees. Prerequisite: Permission of instructor. (3S) **Lanner**

220. Advanced Forest Autecology. Advanced treatment of the effects of various environmental factors on tree development, and consideration of the consequent reverse action of the tree itself on the environment. (3W) **Schultz**

221. Advanced Forest Synecology. Advanced treatment of the community relations of forest stands, their internal structure, and their effect on the surrounding environment. (3W) **Daniel**

222. Forest Ecosystem Analysis. Detailed investigation of the autecology and synecology of selected forest ecosystems; interpretation of the dynamics of the ecosystem. (3Sp) **Staff**

400. Continuing Graduate Advisement. Graduate students who have received maximum thesis credit, but who have not completed the thesis or dissertation, must enroll for a minimum of three credits, until the degree is completed. If the student does not comply, his candidacy may be suspended and his supervisory committee dissolved. (3F, 3W, 3Sp, 3Su.) **Staff**

Department of

Range Science

HEAD: L. A. STODDARD, Professor; PhD, University of Nebraska

OFFICE: Forestry and Zoology 161

ARTHUR D. SMITH, Professor; PhD, University of Michigan

J. B. GRUMBLES, Associate Professor; PhD, Texas A and M University

MARTYN M. CALDWELL, Assistant Professor; PhD, Duke University

GEORGE B. COLTHARP, Assistant Professor; PhD, Michigan State University

GERALD FREDERIC GIFFORD, Assistant Professor; MS, Utah State University

JACK F. HOOPER, Assistant Professor; PhD, University of California

NEIL E. WEST, Assistant Professor; PhD, Oregon State University

Collaborators: P. E. PACKER, MS; WILLIAM A. LAYLOCK, PhD

The Master of Science degree and the Doctor of Philosophy degree are offered in Range Science and related fields such as plant ecology, watershed management, range economics, and game-range management. The program of instruction

and research leading to these degrees is available only to students meeting high scholastic standards and who are accepted by the department staff. Students desiring entrance to these graduate programs should contact the depart-

ment head for information concerning eligibility.

Cooperation with other departments and research centers of the University and with government collaborators permits strong graduate programs in all phases of range-related sciences. Particular mention should be made of the University's Ecology Center, in which the range department is very active, the Utah Agricultural Experiment Station which has a full program in both applied and basic range research, the Center for Water Resources Research sponsoring range watershed research, the cooperative Utah Fish and Game Department program in Big Game-Range Research, and the Forest and Range Experiment Station which maintains a research center on the campus for range and watershed research.

There are available to graduate students a number of assistantships and fellowships which will defray most of the costs of attending school, including exemption from nonresident tuition fees. The department qualifies under the National Defense Education Act, University Fellowships, and National Science Foundation programs. Teaching assistantships and research assistantships, which are attached to existing faculty research programs, involve part-time work for the Department.

Students interested in financial aid for graduate training should write to the department head for details early in the school year preceding initiation of graduate work.

Range Science Courses

GRADUATE AND UNDERGRADUATE COURSES

126. Plant Ecology. Role of heredity and environment in plant behavior; plant succession, competition and indicators; analysis of

habitat factors influencing plant growth and distribution. Prerequisites: Plant taxonomy and general soils. Lab fee \$1. (5F, Sp)

Stoddard

130. Grassland Communities. Composition, distribution, successional patterns, and management of grassland ranges. Prerequisites: Plant taxonomy and Range 131. Two lectures, one lab. (3W)

Grumbles

131. Forest Range Communities. Composition, distribution, successional patterns, and management of forested ranges. Prerequisite: Plant taxonomy. Two lectures, two labs. (4F)

West

132. Desert Plant Communities. Composition, distribution, successional patterns and management of desert ranges. Prerequisite: Plant taxonomy and Range 131. Lab fee \$10. Two lectures, one lab. Saturday field trips may be scheduled. (3Sp)

West

160. Applied Range Science. An introductory course in range science. Range 161 must be taken concurrently. (5F)

Cook

161. Range Analysis Techniques. Theory, application and limitations of vegetation analysis methods and techniques. Field practice in vegetation sampling and range analysis. Credit not allowed those with credit in Range 98. Lab fee \$3. Field trips to be arranged. (2F)

Grumbles

162. Range Management. A terminal course for non-range majors dealing with management of native range lands; maintenance of production; utilization of range forage; and range livestock management. Prerequisite: summer camp or permission from instructor. (5Sp)

Grumbles

163. Range Improvement. Methods and problems involved in seeding range lands, removing brush, improving stock watering facilities, and fencing ranges. Terracing, water spreading and use of dams on range lands. Prerequisite: Range 160 or 162. (3W)

Grumbles

164. Technical Problems in Range Management. Specialized problems in range administration and science encountered by the technician. Prerequisite: Range 160 or 162. (3W)

Stoddard

170. Range Land Appraisal. Principles of appraising land, with special reference to ranges. Prerequisite: Range economics or equivalent. (3S)

Hooper

180. Watershed Management. Principles and methods involved in managing range and forest lands for optimum production and regulation of water yields and for maintaining soil stability. Three lectures, one lab. Lab fee \$4. Saturday field trips may be scheduled. Prerequisite: Range 126. (4W) **Coltharp**

181. Range Economics. Development of the range industry, cost of production, range land utilization, organization of cattle and sheep industry, and value of range forage. Prerequisite: Range 160 or 162. (3F) **Hooper**

193. Range Seminar. Supervised discussion and review of range animal literature. (2W) **Hooper**

194. Range Seminar. Supervised discussion and review of range plant literature. (2Sp) **Coltharp**

195. Range Problems. Individual study and research upon selected problems in range science and related subjects. Prerequisite: Faculty approval. (1-3 F, W, Sp, Su) **Staff**

196, 197. Range Field Problems. Field study of range management operations and research. Courses 196 and 197 are given alternate years. Lab fee \$50. Prerequisite: Plant Ecology and Plant Communities. (3F) **Hooper**

GRADUATE COURSES

200. Range Thesis. Original research and study on a problem in range science. (1-15F, W, Sp, Su) **Staff**

202. Readings and Conference. Selected readings in range science and related subjects. (1-3F, W, Sp, Su) **Staff**

204. Land Use Seminar. Current problems and practices in land resource allocation and administration with special emphasis on the western range. (2F) **Hooper**

***205. Seminar in Range Nutrition.** Problems in research in the field of plant and animal nutrition on rangeland. Prerequisite: Animal Nutrition. (3W) **Cook**

****206. Research Methods.** A study of research methods in range science and related subjects. Prerequisite: Statistics. (3W) **Cook**

207. Graduate Seminar. Review of current research in range science by graduate students and faculty. (1Sp) **Gifford**

***210. Plant Autecology.** Advanced study of effects of factors of the environmental complex upon native plants. Prerequisites: Plant Ecology and Plant Physiology. Two lectures. One lab. (3W) **Caldwell**

****211. Plant Synecology.** Development, structure and classification of native vegetation. Prerequisite: Plant Ecology. Statistics suggested. (3W) **West**

***215. Plant Geography.** The distribution of native vegetation of the world in relation to environment. Offered alternate years. Prerequisites: RS 126 and 211. (3W) **West**

***221. Plant Ecophysiology.** Advanced study of the integration of plant ecology and physiology in analyzing response of native plant species to their environments. Offered alternate years. Prerequisites: RS 126 and Bot 120. (3Sp) **Caldwell**

***280. Watershed Analysis.** Advanced study of principles, technical problems, and procedure encountered in managing watersheds. Prerequisite: Range 180. (2Sp) **Gifford**

***281. Advanced Range Economics.** Advanced study of economic factors affecting land management practices with special consideration to range lands and range operations. Prerequisite: Range Economics. (2Sp) **Hooper**

*Taught 1969-70

**Taught 1968-69

Department of

Wildlife Resources

HEAD: WILLIAM F. SIGLER, Professor; PhD, Iowa State University
OFFICE: Forestry and Zoology 163

GEORGE H. KELKER, Professor; ScD, University of Michigan; postdoctoral work, University of British Columbia
J. B. LOW, Professor; PhD, Iowa State University
JOHN M. NEUHOLD, Professor; PhD, Utah State University.

- ALLEN W. STOKES, Professor; PhD, University of Wisconsin; postdoctoral work, Cambridge University
- FREDERIC H. WAGNER, Professor; PhD, University of Wisconsin
- WILLIAM T. HELM, Associate Professor; PhD, University of Wisconsin; postdoctoral work, University of Wisconsin
- ROBERT H. KRAMER, Associate Professor; PhD, University of Minnesota; postdoctoral work, University of Minnesota
- DAVID F. BALPH, Associate Professor; PhD, Utah State University
- JAMES JUAN SPILLETT, Assistant Professor, ScD, Johns Hopkins University
- CLAIR B. STALNAKER, Assistant Professor; PhD, North Carolina State University
- GAR W. WORKMAN, Assistant Professor; PhD, Utah State University

The department offers research opportunities in many areas of terrestrial and aquatic ecology and animal behavior in addition to problems dealing more directly with wildlife conservation. These lead to MS and PhD degrees.

The department operates or has access to the following research facilities: a large new aquarium facility operated as an aquatic toxicology and physiology laboratory, the Bear Lake Biological Laboratory, a new experimental fish hatchery, a river studies laboratory area, and a radioecology and behavior laboratory.

Assistantships. The Utah Cooperative Wildlife Research Unit and the Utah Cooperative Fishery Unit provide research assistantships for graduate students in the department. The Department has two teaching assistantships and numerous research assistantships supported by research grants from state, federal, and private agencies. Applications for assistantships should be directed to the head of the department.

Wildlife Extension. The department has a program in wildlife extension in cooperation with the Extension Service and the Utah State Department of Fish and Game.

Wildlife Resources Courses

GRADUATE AND UNDERGRADUATE COURSES

131. **Management of Wildlife Habitat.** Habitat requirements of game and methods of providing them. Prerequisite: Wildlife 145. Two lectures, one lab. (3F) **Stokes**
132. **Management of Wildlife Populations.** Study of population characteristics of big game, waterfowl, upland game, and furbearers and the implications of these to human exploitation, control of pest species, artificial propagation, and other management problems. Three lectures and one laboratory exercise indoors or in the field weekly. (4W) **Wagner**
133. **Management Aspects of Wildlife Behavior.** Management of major game species with regard to their behavior. Prerequisite: Wildlife 145. Two lectures, one lab. (3Sp) **Balph**
145. **Principles of Wildlife Management.** Characteristics of animals and their habitat in relation to general management practices. (3W) **Stokes, Helm**
148. **Animal Behavior.** Maintenance and social activity of a variety of animals stressing behavioral adaptation and behavioral regulation of animal numbers. Three lectures, one lab. (4F) **Stokes**
- Ichthyology (Zoology 155).** Ecology, classification and life histories of native and introduced fishes. Two lectures, two labs. (5W) **Sigler**
155. **Economic Wildlife.** General importance of wildlife resources; natural history, economic values and control methods for rodents and predators; identification of skulls and skins; brief evaluation of hawks and reptiles. Two lectures, one lab. (3W) **Kelker**

****156. Radiation Ecology.** Distribution and effects of natural and artificially produced radionuclides in the environment. Ecological techniques utilizing radioisotopes. Three lectures. (3Sp) **Martin**

158. Wildlife Seminar. Discussions of conservation programs, employment opportunities, and new developments in research and management. (1W) **Low**

159. Diseases of Fish. The common diseases of both cold and warm water fish. Methods of diagnosis and treatment. Two lectures. (2W) **Goede**

160. Animal Ecology. Distribution and behavior of animals as affected by various environmental factors. Special attention to inter-relationships of biotic communities. Four lectures, one lab, including field problems. (5F, Su) **Wagner, Balph**

161. Limnology. A study of the physical, chemical and biological interactions in lakes and other fresh waters. Three lectures, one lab. (4F) **Neuhold**

162. Fishery Biology. Anatomy, development, respiration, and excretion of fresh water teleosts. Two lectures, two labs. (4W) **Neuhold**

***163. Instrumental Ecology.** Theory of instrumental methods used to study environmental factors and their effects on wildlife. Three lectures. (3Sp) **Martin**

164. Fish Populations. General population characteristics, methods of enumeration, and determination of mortalities. Prerequisite: Permission of instructor. Two lectures. (2W) **Staff**

165. Fishery Principles. Principles of fish management in lakes and streams. Fish population structure and fish life history parameters. Prerequisite: Zool 155. Three lectures, one lab. (4W) **Kramer, Neuhold, Stalnaker**

166. Aquatic Ecology. Relationships between water and various animals, particularly fishes. Special attention to effects of topography, geography, rainfall, water quality, and various aspects of civilization on aquatic resources. Three lectures. (3Sp) **Helm**

167. Principles of Fish Culture. The principles of fish culture, fish hatchery management, diseases and nutrition of hatchery-reared fish. Three lectures. (3F) **Workman**

***168. World Fishery Resources.** Development, economic significance, problems, and application of research to management of selected commercial fisheries of the world. Three lectures. (3Sp) **Kramer**

169. Fishery Techniques. Techniques of life history study, fish sampling, habitat management, and fish stocking. Prerequisite: WLR 165. Three lectures and one lab. (4S)

Helm, Neuhold, Sigler, Workman

172. Problem Orientation. A discussion of the needs of an approach to wildlife investigations, presenting data, analyzing the problem, and drawing conclusions relative to research in wildlife management. Three lectures. (3W) **Kelker**

175. Wildlife Law Enforcement. Review of state and federal regulations of fish and game; discussion of apprehension of violators, collection of evidence and its use in court. Three lectures. (3W) **Sigler**

GRADUATE COURSES

210. Advanced Field Problems. Field training in techniques not covered in undergraduate courses. (1 to 5F, W, Sp) **Staff**

248. Analysis of Animal Behavior. Cause, function, and development of behavior among animals. Prerequisite: Wildlife 148. Three lectures, one lab. (4W) **Balph**

253. Advanced Big Game Management. Population dynamics, census methods, hunting regulations, and management plans. Prerequisite: Wildlife 153 or equivalent. Two lectures, one lab. (3W) **Wagner**

257. Graduate Seminar. Discussion of current investigation and management programs by class and staff members and by representatives of state and federal agencies. (1F, W, Sp) **Helm, Low, Neuhold**

260. Ecology of Animal Populations. Growth, fluctuation, balance, and control of animal populations. Prerequisite: Wildlife 160 or equivalent. Four lectures. (4W) **Wagner**

261. Advanced Limnology. Advanced study of factors affecting productivity of fresh water. Prerequisite: Wildlife 101 or equivalent. Two lectures, two labs. (4F) **Sigler**

****262. Fish Population Theory.** Study and discussion of the mathematical models which are in use in the field of fisheries. Four lectures, one discussion period. (5W) **Kramer**

270. Research and Thesis. Credit for field or laboratory research, library work, and thesis writing. (1 to 15F, W, Sp, Su) **Staff**

*Taught 1968-69

**Taught 1969-70

180 *College of Natural Resources*

280. Seminar in Animal Population. Advanced readings, discussion, and critical analyses of population dynamics, limiting mechanisms, and theories of population regulation in animals. One class weekly. (1F, W) **Wagner**

281. Aquatic Environmental Interactions. Advanced readings analyses, and discussion on the effects of interacting physical, chemical, and biological factors of the aquatic environ-

ment on aquatic animals. One class weekly. (1F, W, or Sp) **Neuhold**

282. Seminar in Animal Behavior. Advanced readings, discussion, and critical analyses of current research in animal behavior and behavioral ecology. One class weekly. (1F, W) **Balph**

*Taught 1968-69

**Taught 1969-70

*College of***Science**

DEAN: RALPH M. JOHNSON, PhD, University of Wisconsin

OFFICE: Forestry and Zoology 101

*Department of***Applied Statistics, Computer Science**

HEAD: REX L. HURST, Professor; PhD, Cornell University

DIRECTOR OF GRADUATE PROGRAM: DONALD B. SISSON, Associate Professor; PhD, Iowa State University

OFFICE: Main 2

BARTELL C. JENSEN, Associate Professor; PhD, Purdue University

DAVID R. HARRIS, Assistant Professor; PhD, University of Colorado

RONALD V. CANFIELD, Assistant Professor; PhD, University of California, Davis

EUGENE KARTCHNER, Assistant Professor; PhD, University of Washington

WENDELL L. POPE, Assistant Professor; MS, Stanford University

DAVID WHITE, Assistant Professor; PhD, Oklahoma State University

The Department offers the Master of Science Degree in Statistics. Statistics is that branch of science which deals with developing tools of statistical inference; statistical inference is the inductive process of generalizing from the particular to the general on the basis of sample evidence. The foundation of statistical inference lies in the theory of probability which provides a measure of uncertainty of conclusions drawn from experimental data.

The experimental scientists of many fields of endeavor use statistics extensively as a tool of research because it provides means for summarizing large masses of data, estimating parameters, testing hy-

potheses, and formulating mathematical models to simulate physical biological situations.

Dr. Donald V. Sisson is in charge of the graduate program in the department. Either Dr. Sisson or Dr. Hurst, Department Head, will be happy to provide further information.

Graduate Minor. A graduate minor in Statistics must fill University requirements as to total number of credit hours and must include one of the following: Applied Statistics 176, 177, 178, or 261, 262, 263, or Mathematics 161, 162, 163; and any two of the following: Applied Statistics 221, 233, 241, 281, 291, 292, or Computer Science 245, 246.

Applied Statistics Courses**GRADUATE AND UNDERGRADUATE COURSES**

121. Statistical Methods for the Social Sciences. A computer oriented course in elementary statistics, designed for students whose majors are in sociology, education, and the family living areas. Data and examples are from the social sciences. Random sampling. Population parameters and their sample estimates. Frequency distributions. Use of data processing equipment. Analysis of variance. Contingency tables. Data processing for analysis of variance and contingency tables. Practice in the design, execution, and interpretation of results for statistically oriented research projects. Prerequisite: high school algebra. (4F) **Staff**

122. Statistical Methods for the Social Sciences. A continuation of Applied Statistics 121. Elementary Probability. Two-way contingency tables. Double and triple summation. Analysis of variance tables. Fixed and random models in Analysis of Variance. Cluster sampling and its relationship to analysis of variance. Data processing for analysis of variance with cluster sampling. Prerequisite: Applied Statistics 121. (4W) **White**

123. Statistical Methods for the Social Sciences. A continuation of Applied Statistics 122. Three stage cluster sampling; components of variance. Stratified sampling; randomized block designs; interaction in randomized block designs; data processing. Graphing equations; regression analysis. Analysis of co-variance. Data processing for regression analysis and analysis of covariance. Bivariate frequency distributions; correlation coefficients (4Sp) **White**

131. Statistical Methods. Sample-based inferences about populations. Individual and group comparisons. Tests of significance. Linear regression and correlation. Prerequisite: Math 35 or equivalent. (4F, W) **Staff**

132. Statistical Methods. Analysis of variance and covariance. Individual degrees of freedom. Multiple regression. Prerequisite: Applied Statistics 131 or equivalent. (4W, S) **Staff**

133. Statistical Methods. Multiple regression, curvilinear regression, multiple and curvilinear covariance, least squares analysis of basic designs. Prerequisite: Applied Statistics 132. (4Sp) **Hurst**

134. Design of Experiments. Fundamental principles of experimental design; completely randomized; randomized blocks, latin squares, components of variance; factorial arrangements; confounding; split plot; incomplete

block designs; and fractional replication. Prerequisite: Applied Statistics 132 or equivalent. (4Sp) **Sisson**

141. Sampling Methods. The methods and theory of obtaining sample estimates of population characteristics. Reliability of sample estimates. Types of sampling procedures. Analysis and interpretation of samples. Prerequisites: Applied Statistics 51, 131, or equivalent. (3W) **Staff**

150. Computer Applications in Statistics. Editing and reworking data prior to analysis; using Monte-Carlo methods to design experiments; the analysis of experimental design data; the analysis of questionnaire data; covariance analysis of basic designs; pooled analyses. Prerequisites: Ap. St. 133, 134; C. S. 167. (3W) **Staff**

171. Statistical Theory for Research Workers. An introduction to the theory of statistical inference; probability; discrete and continuous probability density functions and their properties; expected values; variances, moments, cumulants and their generating functions; orthogonal linear functions; sampling distributions; central limit theorem. Prerequisite: Calculus. (3W) (Taught on demand) **Sisson**

172. Statistical Theory for Research Workers. Optimum properties of estimators; theory of point estimation; principle of maximum likelihood; theory of confidence interval estimation and test of hypothesis; likelihood ratio test; goodness-of-fit test; theory of least squares; general linear hypotheses and their application to regression and experimental design. Prerequisite: 171. (3Sp) (Taught on demand.) **Sisson**

176. Introductory Theory of Statistics. Set operations, combinatorial methods, probability, discrete frequency distributions, expectations, moments and moment generating functions. Prerequisite: Calculus and a knowledge of statistical methods. (3F) **Sisson**

177. Introductory Theory of Statistics. Continuous frequency distributions, expectations, moments and moment generating functions, linear combinations of variables, sampling and sampling distributions, point and interval estimation. Prerequisite: 176. (3W) **Sisson**

178. Introductory Theory of Statistics. The testing of hypotheses, Type I and Type II errors, power of the test, application of theory to the testing of means and to testing of relationships among variables. Prerequisite: 177. (3Sp) **Sisson**

198. Special Problems. Conferences, reading, and laboratory investigations. (Arranged F, W, Sp) **Staff**

199. **Seminar.** Review of current literature and developments in the field of statistics. (1-3, F, W, Sp) **Staff**

GRADUATE COURSES

221. **Industrial Statistics: Sampling Inspection.** Control of quality of manufactured products; attribute and variable inspection; single, double and sequential plans; sampling plans for continuous production; cost functions and elementary decision functions. Prerequisite: 172, 263. (3 Su) (Taught on demand.) **Staff**

233. **Biological Statistics.** Biological assays; quantitative and quantal responses; dosage-response relationships; parallel line and slope-ratio assays; relative potency and LD 50; biological populations and transformations. Prerequisite: Applied Statistics 132. (3Sp) (Taught on demand) **Sisson**

241. **Stochastic Processes.** An introduction to stochastic processes and their properties. The probability law of a stochastic process. Conditional probability and conditional expectation. Fundamental properties of specific stochastic processes; the Normal process, the Wiener process, the Poisson process and its generalizations. Counting and renewal counting processes. Markov chains. Specific applications to physics, communication theory, biology, economics, etc. Prerequisite: Probability Theory. (3) (Taught on demand.) **Staff**

250. **Computer Applications in Statistics.** Using Monte-Carlo methods to generate data according to mathematical models, experimental design data, regression data; the analysis of regression data, multiple regression, generalized curve fitting; the generalized analysis of covariance; multivariate analysis of variance and covariance; factor analysis; Canonical Correlation; Discriminant Functions. Prerequisites: Ap. St. 150, 291. (3Sp) **Staff**

261. **Intermediate Theory of Statistics.** Probability theory; basic notion of sets, sample description space, events, algebra of events, probability of an event, probability theorems, combinatorial analysis, conditional probability, Bayes' Theorem, independent events, independence of several events, random variable, probability functions, distribution functions, discrete distributions; Bernoulli trials, Binomial, Multinomial, Hypergeometric, Poisson, negative binomial distributions, limiting theorems, continuous distributions, probability functions for continuous variate, multivariate distributions, transformations, expectation of a random variable, expectation, moment, moment generating functions, moments of multivariate distributions. Prerequisite or corequisite: Mathematics 99, 160. (5W) **White**

262. **Intermediate Theory of Statistics.** Important continuous distribution, uniform, normal, gamma, beta distribution and others, inductive inference; populations and samples, Chebyshev's inequality; law of large numbers; the central limit theorem; point estimation; optimum properties of estimators; principle of maximum likelihood; multivariate normal distribution; bivariate normal, multivariate normal marginal and conditional distributions; the moment generating functions; derived distributions; distributions of functions of random variables, chi-square, student's F distributions; large sample theory; asymptotic distributions of maximum likelihood estimators. Prerequisite: 261. (5W) **White**

263. **Intermediate Theory of Statistics.** Interval estimation, confidence limits, judicial limits, confidence interval and regions for parameters of well known distributions, test of hypotheses; regression and linear hypotheses; analysis of variance; sequential tests of hypotheses and distribution-free methods. Prerequisite: 262. (3Sp) **White**

281. **Sampling Design.** Principle steps in sample surveys; simple random sampling; properties of the estimators; sampling for proportions and percentages; estimation of sample size; two stage sampling; stratified random sampling for percentages. Prerequisite: 172 or 263. (3F) (Taught on demand) **Sisson**

291. **Applied Experimental Design I.** A course dealing with analysis of variance techniques commonly encountered in many fields of research. Variance components; nested and crossed relationships between factors; generalized methods of obtaining expected mean-squares in analysis of variance; analysis of covariance; data with unequal numbers of observations in subclassifications; utilization of appropriate computer programs. Prerequisite: 134 and 173 or 178. (3F) **White**

292. **Applied Experimental Design II.** General least-squares theory for experimental designs; confounding for symmetrical factorial designs, number of levels a prime power; fractional replications; double confounding; latin squares; partial confounding; balanced incomplete block designs. Prerequisite: Applied Statistics 291, Math 160. (3W) **White**

293. **Applied Experimental Design III.** General formulas for pn factorials; confounding plans for prime-power factorials; confounding plans and fractional replications for mixed factorials; sequential analysis. Prerequisite: Applied Statistics 292. (3Sp) **White**

297. Thesis and Research. Outlining and conducting research in statistics. Thesis preparation. Credit arranged. (F, W, Sp, Su) **Staff**

298. Special Problems. Individual study and report preparation in areas of special interests. Training in professional consulting. (F, W, Sp) **Staff**

400. Continuing Graduate Advisement. Graduate students who have received maximum thesis credit, but who have not completed the thesis or dissertation, must enroll for a minimum of three credits, until the degree is completed. If the student does not comply, his candidacy may be suspended and his supervisory committee dissolved. (3F, 3W, 3Sp, 3Su.) **Staff**

Computer Science Courses

GRADUATE AND UNDERGRADUATE COURSES

145. Computer Programming. The characteristics and instruction repertoire of a modern digital computer; the organization of problems for solution using a computer; the use of machine language programming in problem solving. Two lectures, one lab. Prerequisite: C. S. 11 or permission of instructor. (3W) **Staff**

146. Computer Programming. Continuation of C. S. 145. Assembly level languages for programming digital computers. Students are expected to gain programming proficiency sufficient to be able to solve problems from their own fields using a computer. Two lectures, 1 lab. Prerequisite: C.S. 145. (3Sp) **Staff**

157. Programming Business Problems (FORTRAN). Discussion of problem-oriented programming language; contrasting the more common languages with regard to their most effective areas of application. This course will define the characteristics and applications of the FORTRAN programming language as it relates to business problems. Students are expected to learn the fundamentals of the FORTRAN language and to gain experience in applying the computer to the solution of typical problems arising in the business world using this language. Prerequisite: C.S. 11 or permission of instructor. (3F, W) **Staff**

158. Programming Business Problems (COBOL). Discussion of problem-oriented programming languages. This course will define the characteristics and application of the COBOL (Common Oriented Business Language) programming language. Students are expected to learn the fundamentals of COBOL and to gain experience in writing COBOL programs for the purpose of solving prob-

lems in their own areas of interest through the use of a computer. COBOL is designed primarily for problems dealing with updating, analyzing, and reporting data contained in file form while FORTRAN is particularly applicable to Operations Research Type problems. Prerequisite: C.S. 11 or permission of instructor. (3W, Sp) **Staff**

167. Programming Scientific Problems. Discussion of problem-oriented programming languages (compilers); the use of a compiler language to write programs for a computer. Students are expected to learn a programming language such as FORTRAN and to solve problems in their own fields using a computer. Two lectures, one lab. Prerequisite: C.S. 11 or permission of instructor. (3F, W, Sp) **Staff**

168. Advanced Programming. Discussion of the problems involved in implementing higher level languages; the algorithmic language ALGOL for describing algorithms; special programming problems. Prerequisite: C.S. 146 and C.S. 167. (3F) **Staff**

175. Operations Research: Methods and Problems. A study of the problems and methods in operations research. Problem areas to be included for analysis are: inventory, replacement, waiting lines, competitive strategies, allocation, sequencing and dynamic programming. Prerequisite: Economics 52 and Mathematics 99. (5F) **Jensen**

181. Compiler Languages. The construction of symbolic language processors, problem oriented language processors, procedure oriented language processors, and their supporting libraries. Prerequisite: C.S. 168. (3W) **Pope**

182. Monitors and Systems Design. The organization and construction of a monitor; the organization of supporting systems, including utility programs, input-output programs, report generators, simulator systems and sort systems. Prerequisite: C.S. 181. (3Sp) **Pope**

196. Special Problems. This course is designed to give the student an opportunity to apply the knowledge that he has gained in the preceding courses in computer science to the solution of problems that are of particular interest either for the staff member or for the student involved. **Staff**

197. Seminar. Review of current literature and developments in the field of computer science. (1Sp) **Staff**

GRADUATE COURSES

245. Techniques in Operations Research. A study of the methods and techniques used in operations research and systems engineering to

efficiently organize complex systems. The study will include linear programming, assignment and allocation of resources, inventory control, least cost estimating and scheduling. Prerequisite: Graduate standing or permission of the instructor. (3W) **Jensen**

246. Techniques in Operations Research. Continuation of Computer Science 245. Study will include queing theory, replacement models, dynamic programming, game theory and Monte

Carlo methods. Prerequisite: Graduate standing or permission of instructor. (3Sp) **Jensen**

400. Continuing Graduate Advisement. Graduate students who have received maximum thesis credit, but who have not completed the thesis or dissertation, must enroll for a minimum of three credits, until the degree is completed. If the student does not comply, his candidacy may be suspended and his supervisory committee dissolved. (3F, 3W, 3Sp, 3Su.) **Staff**

Department of

Bacteriology and Public Health

HEAD: REX S. SPENDLOVE, Professor; PhD, Ohio State University
OFFICE: Plant Industry 309

LEWIS W. JONES, Professor; PhD, Stanford University; postdoctoral work, University of California

GARY H. RICHARDSON, Professor; PhD, University of Wisconsin

W. WHITNEY SMITH, Professor; PhD, University of Wisconsin

KENNETH R. STEVENS, Emeritus Professor; PhD, Rutgers University; postdoctoral work, University of Illinois

PAUL B. CARTER, Associate Professor; PhD, University of Utah

FREDERICK J. POST, Associate Professor; PhD, Michigan State University

CARL A. WESTBY, Assistant Professor; PhD, University of California

The Department of Bacteriology and Public Health has good facilities for research and advanced studies. The department occupies the third and one-half of the fourth floors of the Plant Industry building which house the usual technical instruments. Ground will be broken for a new and enlarged Bacteriology Building in 1967. The Department also has access to an electron microscope, ultra centrifuge, electrophoresis apparatus, spectograph, flame spectrophotometer, and other major research instruments.

Master of Science in Bacteriology. The Master's degree in bacteriology combines a substantial research effort with a rounding out of the course work in bacteriology and related subjects. At the

conclusion of the Master's degree the student is expected to have completed the bacteriology courses offered in the department, chemistry through some advanced biochemistry, mycology and protozoology.

Doctor of Philosophy in Bacteriology. The doctorate in bacteriology is primarily a research degree. A doctoral thesis comprising an intensive and definitive contribution to knowledge is the most basic requirement. In previous training or in the doctoral program the student is expected to have completed course work in bacterial physiology, immunology, systematic bacteriology, and in the microbiology of disease, soil, water, dairy, other foods, and in other

applied microbiology subjects. Furthermore the student should be versed in mycology, virology, protozoology, and if possible algology. As minors bacteriologists commonly take graduate courses in biochemistry, genetics, and/or many other specialties.

Moreover, the candidate must present evidence of a satisfactory command of: applied statistics plus a reading knowledge of German, French, or Russian; or a reading knowledge of two foreign languages of scientific significance. The statistics and language requirements should be completed one year before the thesis is presented.

Bacteriology Courses

GRADUATE AND UNDERGRADUATE COURSES

104. Dairy Bacteriology. Micro-organisms of milk and its products. Prerequisite: Bacteriology 70. (3F) **Jones**

105. Dairy Bacteriology Laboratory. Two 3-hour labs. Prerequisite: Bact 70, and previous or concurrent registration in Bacteriology 104. (2F) **Jones**

****110. Soil Microbiology.** Relationships of micro-organisms to soil fertility. Prerequisite: Bacteriology 70. (2Sp) **Jones**

120. Food Microbiology. Relationships of micro-organisms to food preservation, spoilage, and poisoning. Prerequisite: Bacteriology 70. (2F) **Post**

121. Food Microbiology Laboratory. Prerequisite: Bacteriology 70 and previous or concurrent registration in Bacteriology 120. (2F) **Post**

160. Pathogenic Bacteriology. Properties of pathogens and relationships to infectious diseases. Prerequisite: Bact. 70 or equivalent and Organic Chemistry. Three lectures, two labs. (5F) **Carter**

***161. Advanced Pathogenic Microbiology.** Common pathogenic molds, yeasts, and viruses. Prerequisite: Bacteriology 160. Four lectures, one lab. (5Sp) **Staff**

168. Immunology. Prerequisites: Bact 160 and Biochemistry. Three lectures, two labs. (5W) **Carter**

170. Virology. An introduction to viruses including consideration of chemical, physical, and hereditary characteristics; pathogenesis; immunity; virus-host relationships. Prerequisite: Immunology or consent of Instructor. Three lectures, two labs. (5W) **Spendlove**

***172, 173. Bacteriology Laboratory Methods.** (2W, 2Sp) **Staff**

180. Bacterial Physiology. Microscopy, cellular physiology, cytology and dynamics. Prerequisites: Bact. 70, Organic Chemistry. (4W) **Westby**

192. Aquatic Microbiology. Principles of microbiology (limited to the Kingdom Protista) relevant to the aquatic environment. Emphasis placed on fresh water and wastewater, with some discussion of estuarine and marine microbiology. Prerequisites: Bacteriology 70; or CE 194 and WLR 161. Three lectures, 1 lab. (4Sp) **Post**

198. Undergraduate Problems Course. Special directed studies on current problems and research in microbiology utilizing the literature, seminar, and laboratory investigation as it suits the student. May be repeated for credit. (1-3F, W, Sp, Su) **Staff**

GRADUATE COURSES

****201. Systematic Bacteriology.** Classification relationships. Prerequisite: Bacteriology 70. (2Sp) **Smith**

291. Seminar. (1F, W, Sp) **Staff**

294. Special Problems in Bacteriology. Special assignments, reports, and discussions. Preparation of a comprehensive and critical review. Credit arranged. Prerequisite: consent of instructor. (F, W, Sp) **Staff**

299. Thesis Research. Credit arranged. (F, W, Sp) **Staff**

400. Continuing Graduate Advisement. Graduate students who have received maximum thesis credit, but who have not completed the thesis or dissertation, must enroll for a minimum of three credits, until the degree is completed. If the student does not comply, his candidacy may be suspended and his supervisory committee dissolved. (3F, 3W, 3Sp, 3Su.) **Staff**

Public Health Courses

GRADUATE AND UNDERGRADUATE COURSES

140. Work Shop in Nursing Home Administration. Lectures, discussion groups, visual

*Taught 1968-69

**Taught 1969-70

aids and quizzes in small groups on problems in the administration of nursing homes. (Visiting specialists will lecture in their areas. After lectures the small groups led by staff from New York, Denver, and Salt Lake will meet.) 39 clock hours, 5 days. Brighton, Utah. As arranged for special groups. (1F, W, Sp, Su) **Smith**

149. Current Problems in Community Health. The current emerging problems: air and water pollution, effects of urbanization and the population explosion, proliferation and agricultural poisons, low incidence of communicable disease, radiation hazards, etc. (2Su) **Smith**

150. Environmental Sanitation. Consideration of regular public health sanitation programs such as waste disposal, water treatment, refuse disposal, insect and rodent control, food and milk, industrial hygiene and radiological sanitation. (4Sp) **Post**

***151. Public and School Health Administration.** Organization, administration and functions of health agencies. Prerequisite: PH 50. (3F) **Staff**

152. Family Health. A broad course on the fundamentals of healthful living. Open to all upper division students; especially for juniors who are required for state of Utah certification to take a course in family health. Does not meet the school health requirement for state of Utah certification. (3W) **Daines**

154. School Health Program. The program for health in elementary and secondary schools. A healthful environment, healthful living, and health instructions. (4F, W, Sp, Home study) **Smith**

155. Health Education for Teachers. School Health. Classroom health problems. Communicable diseases of the classroom. School health laws. (3, W, Sp, Su) **Smith**

****156. School Health Methods.** Objectives, methods, curricula, and materials. Prerequisite: P H 155. (3Sp) **Staff**

159. Public Health Laboratory Methods. Experience in the practice of the Public Health Laboratory. (3 to 5 F, W, Sp) **Fraser**

GRADUATE COURSES

254. Special Problems in Public Health. Assignments, reports, discussions. Preparation of a comprehensive and critical review. Credit arranged. (F, W, Sp) **Staff**

400. Continuing Graduate Advisement. Graduate students who have received maximum thesis credit, but who have not completed the thesis or dissertation, must enroll for a minimum of three credits, until the degree is completed. If the student does not comply, his candidacy may be suspended and his supervisory committee dissolved. (3F, 3W, 3Sp, 3Su.) **Staff**

*Taught 1968-69

**Taught 1969-70

Department of

Botany

(Cytogenetics, Plant Pathology, Plant Physiology, Taxonomy, Virology)

HEAD: ORSON S. CANNON, Professor; PhD, Cornell University; postdoctoral work, Oregon State University

OFFICE: Plant Industry 204

W. S. BOYLE, Professor; PhD, University of California; postdoctoral work, University of Wisconsin

GEORGE W. COCHRAN, Professor; PhD, Cornell University

ARTHUR H. HOLMGREN, Professor; MS, Utah State University; doctoral work, University of California

GENE W. MILLER, Professor; PhD, North Carolina State University; postdoctoral work, University of Münster, West Germany

RICHARD J. SHAW, Professor; PhD, Claremont Graduate School

HERMAN H. WIEBE, Professor; PhD, Duke University; postdoctoral work, Oak Ridge Institute of Nuclear Studies and Agricultural University, Stuttgart-Hohenheim, West Germany
 GEORGE W. WELKIE, Associate Professor; PhD, University of Wisconsin; post-doctoral work, Rothamsted Experimental Station, England
 GERALD M. BAKER, Assistant Professor; MA, Indiana University; doctoral work, Oregon State University
 IVAN G. PALMBLAD, Assistant Professor; PhD, University of Washington
Collaborators: EUGENE H. CRONIN, PhD; GERALD D. GRIFFIN, PhD; LYNN L. HOEFERT, PhD; EDESEL C. JORGENSEN, MS; WALTER McDONOUGH, PhD; DAVID MUMFORD, PhD; BRYCE N. WADLEY, PhD; M COBURN WILLIAMS, PhD; DAVID E. ZIMMER, PhD

Master of Science Degree. The Department of Botany offers the Master of Science degree in the following specialized fields: Cytogenetics, Plant Ecology, Plant Pathology, Plant Physiology, Taxonomy, Virology. Graduate studies are also offered in the Interdepartmental Curriculum in Plant Nutrition and Biochemistry. The opportunities and facilities for research in these fields are greatly augmented through the cooperation of the USU Agricultural Experiment Station, United States Department of Agriculture, and the Intermountain Herbarium.

In most cases a candidate must submit a thesis on a topic within the field of his major subject; however, with the approval of the major professor, the thesis alternate, Plan B, may be substituted for the thesis if the candidate's primary aim is preparation for teaching with the Master's degree.

Doctor of Philosophy Degree. The Department of Botany, in cooperation with related departments, offers the degree of Doctor of Philosophy in the specialized fields of Plant Ecology, Plant Pathology, Plant Physiology, Taxonomy, Virology, and the Interdepartmental Curriculum in Plant Nutrition and Biochemistry. Detailed information may be obtained from the Department.

Herbarium

Graduate study in plant taxonomy offered in the Department of Botany utilizes the extensive facilities of the Intermountain Herbarium. Most plant species that grow in Utah and the Intermountain region are represented in the herbarium.

Botany Courses

GRADUATE AND UNDERGRADUATE COURSES

102. Taxonomy of Vascular Plants. The kinds, relationships, and classifications of vascular plants, chiefly of this region. Assumes a knowledge of fundamental principles of botany. Three lectures, two labs. (5Sp, Su)
 Holmgren, Shaw

***104. Evolution of Cultivated Plants.** Origin, evolution and distribution of certain selected plants which are of economic importance to man. Prerequisites: Botany 25, 30, Zoology 112 or equivalent. Lectures, readings and student reports. (3F)
 Shaw

108. Agrostology. A taxonomic study of native and imported grasses of western ranges. Special attention is given to species important in grazing and soil binding. Assumes a knowledge of fundamental principles of botany. Two lectures, two labs. (4F)
 Holmgren

112. Aquatic and Marsh Plants. A taxonomic and ecological study of aquatic and marsh plants. Emphasizes important food and cover plants for wildlife. Assumes a knowledge of the fundamental principles of botany. Two lectures, two labs. (4F)
 Holmgren

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GRADUATE COURSES

116. Microtechnique. Principles and methods in preparation of plant materials for microscopic study; efficient use of the microscope. Assumes a knowledge of fundamental principles of botany. (4F) **Boyle**

117. Anatomy. Structure and development of major cell types and tissues; comparative anatomy of the stem, root, and leaf of seed-bearing plants. Assumes a knowledge of fundamental principles of botany. Two lectures, two labs. (4W) **Boyle**

118. Cytogenetics. The structure, functions and modifications of chromosomes and their relationships to genetic phenomena. The laboratory emphasizes plant materials. Prerequisite: Zoology 112. Three lectures, two labs. (5Sp) **Boyle**

120. Elementary Plant Physiology. The principal physiological processes of plants, including water relations, synthesis and use of foods, and growth phenomena. Prerequisites: Botany 24 and Chemistry 12. (Chemistry 12 may be taken concurrently.) Four lectures, one lab. (5W, Sp) **Wiebe**

***121. Water Relations of Plants.** Factors affecting the availability of water, its absorption and use in plants, and the effects of water deficits on plant processes. Prerequisite: Botany 120. (3W) **Wiebe**

***125. Morphology of Vascular Plants.** Structure, development, reproduction, and evolution of the classes and orders of vascular plants. Prerequisites: Botany 24, 25, and 30. Three lectures, two labs. (5F) **Shaw**

130. Principles of Plant Pathology. Fundamental principles underlying disease in plants. The types of disease and methods of study give the student a comprehensive view of plant pathology. Assumes a knowledge of botany fundamentals. Three lectures, two labs. (5F) **Cannon**

***140. Forest Pathology.** Nature, cause and control of disease affecting forest trees. Factors inducing loss in forest products are emphasized. Prerequisites: Botany 24 and 25. Three lectures, one lab. (4W) **Cannon**

150. Mycology, Comparative Morphology and Nuclear Behavior of the Fungi. A summary of the field with special attention given forms important to agriculture, medicine, and industry. Prerequisite: Botany 25. Three lectures, two labs. (5F) **Baker**

160. Fresh-Water Algae. The morphology and identification of the fresh-water algae, with special emphasis to be given to the identification of local materials. Two lectures, two labs. (4Sp) **Baker**

200. Evolutionary Ecology. Synthesis of evolutionary and ecological theory with emphasis on the action of selection on natural populations. Prerequisites: Plant Ecology or Animal Ecology, or consent. Genetics and Mechanics of Evolution suggested. Two lectures, one conference. (3F) **Palmblad**

212. Advanced Plant Taxonomy. A course designed to consider traditional and recent techniques of collecting and synthesizing taxonomic data. Emphasis will be placed on evolution of taxa. Prerequisite: Botany 102. (4Sp) **Holmgren, Shaw**

***224. Plant Growth and Development.** Growth processes, with emphasis on hormones, photoperiod, dormancy. Prerequisite: Botany 120. (3W) **Wiebe**

225. Mineral Nutrition of Plants. Physiological and biochemical processes involved in the mineral nutrition of higher plants. Consideration will be given to specific roles of each nutrient in plant growth and metabolism. Prerequisites: Botany 24, 120 and Chemistry 12. Three lectures, one lab. (4F) **Miller**

***226. Plant Virology.** Physical and chemical properties of viruses and their biological relationships. Prerequisite: Botany 120. Three lectures, two labs. (5W) **Welkie**

***227. Plant Respiration and Metabolism.** A study of the oxidative breakdown of certain organic substances normally present in plant cells and the mechanisms by which sugars are respired to CO_2 and H_2O and the interrelationships between this process and various others going on at the same time in plant cells. Prerequisite: Plant Physiology 120, 3 lectures and 1 lab. (4Sp) **Miller**

***228. Photosynthesis in Higher Plants.** Elucidation of the chloroplast structure and the various mechanisms of photosynthesis: photolysis, electron transfer, chlorophyll excitation, photosynthetic phosphorylation, carbon dioxide fixation and the influence or environmental factors on photosynthesis. Prerequisite: see Instructor, three lectures, one lab. (4Sp) **Miller**

230. Field Plant Pathology. A survey of plant diseases as they occur in Utah. The course includes the identification of diseases, conditions leading to their development, and the formulation of practices leading to their control. Field trips and laboratories. Prerequisite: Botany 120. (3Su) **Cannon**

*Taught 1968-69

**Taught 1969-70

234. **Special Problems.** Individual instruction. Credit arranged. (F, W, Sp, Su) **Staff**
240. **Botany Seminar.** (1F, W) **Staff**
241. **Plant Physiology Seminar.** (1Sp) **Staff**
250. **Research.** Conduct special research in plant cytogenetics, pathology, physiology, or taxonomy. Individual instruction. Credit arranged. (F, W, Sp, Su) **Staff**

400. **Continuing Graduate Advisement.** Graduate students who have received maximum thesis credit, but who have not completed the thesis or dissertation, must enroll for a minimum of three credits, until the degree is completed. If the student does not comply, his candidacy may be suspended and his supervisory committee dissolved. (3F, 3W, 3Sp, 3Su.) **Staff**

Department of

Chemistry

HEAD: MELVIN C. CANNON, Professor; PhD, Boston University
OFFICE: Widtsoe Hall 112

DELBERT A. GREENWOOD, Professor; PhD, University of Chicago
GARTH L. LEE, Professor; PhD, University of Toronto
GRANT GILL SMITH, Professor; PhD, University of Minnesota
JACK T. SPENCE, Professor; PhD, University of Utah
HARRIS O. VAN ORDEN, Professor; PhD, Massachusetts Institute of Technology
RICHARD C. ANDERSON, Associate Professor; PhD, Brigham Young University
BRUCE F. BURNHAM, Associate Professor; PhD, University of California at Berkeley
WILLIAM M. MOORE, Associate Professor; PhD, Iowa State University
TERRY G. ALGER, Assistant Professor; PhD, University of Utah
THOMAS M. FARLEY, Assistant Professor; PhD, University of Wisconsin
RICHARD K. OLSEN, Assistant Professor; PhD, University of Illinois
JAMES WILLIAM SINCLAIR, Assistant Professor; PhD, University of California at Los Angeles

Entrance Examinations. All new graduate students must take entrance examinations in inorganic, organic, physical and analytical chemistry. These will be administered before registration day in the fall quarter and by special arrangement at other times.

Doctor of Philosophy Degree. The Chemistry department offers advanced study and research leading to the degree of Doctor of Philosophy in Chemistry. Before admission to candidacy the student must fulfill the following requirements: (1) Pass the entrance examinations, (2) Demonstrate a reading comprehension of German and of Russian or French; (3) Pass a compre-

hensive examination in a field of specialization, and in two minor fields of chemistry, not later than one academic year before the final examination on the thesis; (4) Present an acceptable statement of a thesis problem. The student should consult the Head of the Department concerning other requirements.

Master of Science Degree. The Chemistry Department offers the Master of Science degree with research in any of the following fields: Analytical, Biological, Inorganic, Organic, and Physical Chemistry.

Four graduate programs leading to a Master of Science or a Doctor of Philosophy degree are

available in cooperation with other departments. (See Interdepartmental Curriculum in Nutrition and Biochemistry, Interdepartmental Curriculum in Food Science and Technology, Interdepartmental Curriculum in Plant Nutrition and Biochemistry and Interdepartmental Curriculum in Toxicology.)

Chemistry Courses

GRADUATE AND UNDERGRADUATE COURSES

116. Inorganic Preparations. A laboratory course in practical methods of synthetic inorganic chemistry. Prerequisites: Chem 20, 111. (Credit arranged) **Staff**

134. Qualitative Organic Analysis. The classification, reactions and laboratory work involved in the identification of unknown organic compounds. Prerequisites: Chem 123, 106. (4Sp) **Olsen, Smith, Anderson**

150, 151. Inorganic Chemistry. Study of the elements, compounds and bonding theories based upon the atomic structure. Prerequisite: Chem 104. Two lectures. (2F, 2W) **Staff**

153. Instrumental Analysis. Theory and application of physico-chemical methods of analysis. Selected electrochemical and optical methods. Prerequisites: Chem 106, 115. Two lectures, one lab. (3W) **Spence**

180. Elementary Biochemistry. A brief survey of the chemistry of biologically important compounds such as carbohydrates, lipids, proteins, nucleic acids and enzymes including their role in animal and plant metabolism. Qualitative and semi-quantitative experiments with important compounds are performed. This is a terminal course normally not intended to meet requirements for more advanced work in biochemistry. Prerequisites: Chem 5, 121. Four lectures, one lab. (5Sp) **Burnham, Farley**

190. Principles of Biochemistry. A study of the chemical and physical behavior of biologically important compounds including the chemistry of carbohydrates, lipids, proteins and hormones with an introduction to enzymatic processes, bioenergetics and metabolism. Prerequisites: Chem 101 or 106 and 122. Four lectures, one lab. (5F) **Burnham, Farley**

191, 192. Principles of Biochemistry. Chemistry of life processes including acid-base phenomena, enzyme catalyzed reactions, bioenergetics, oxidation-reduction, biosynthetic phenomena and the metabolism of biologically important com-

pounds. Prerequisites: Chem 190. Students completing Chem 180 may register with special permission. Three lectures. (3W, 3Sp)

Burnham, Farley

193, 194. Biochemistry Laboratory. Laboratory experiments illustrating general principles in studying biological materials. To accompany Chem 191 and 192. Prerequisites: Chem 190 (or special permission). Two labs. (2W, 2Sp) **Burnham, Farley**

195. General Pharmacology. Lectures and Laboratory work dealing with principles, clinical application and research methods. Prerequisites: Chem 190, 122. Three lectures, two labs. (5W) **Greenwood**

GRADUATE COURSES

201. Quantum Chemistry. Quantum chemistry with emphasis on valence bond and molecular orbital calculations. Prerequisites: Chem 106, Math 110. Three lectures. (3F)

Alger, Sinclair

202. Molecular Spectroscopy and Structure. Theory and applications. Prerequisite: Chem 201. Three lectures. (3W)

Alger, Moore, Sinclair

203. Chemical Kinetics. Theory of reaction rates with application to current research problems. Prerequisite: Chem 201. Three lectures. (3Sp) **Alger, Moore, Sinclair**

***204. Chemical Thermodynamics and Statistical Mechanics.** Advanced chemical thermodynamics from the standpoint of Gibbs. Prerequisite: Chem 106, Math 110. Three lectures. (3F) **Staff**

***205. Chemical Thermodynamics and Statistical Mechanics.** Introduction to statistical mechanics. Prerequisites: Chem 201, 204. Three lectures. (3F) **Staff**

***206. Chemical Thermodynamics and Statistical Mechanics.** Applications of thermodynamics and statistical mechanics to chemical problems. Prerequisite: Chem 205. (3Sp) **Staff**

209. Special Topics in Physical Chemistry. Prerequisites: Chem 203, Math 110. (3) **Staff**

225, 226, 227. Advanced Organic Chemistry. Mechanism, structure and synthesis in organic chemistry. Prerequisites: Chem 106, 123. Three lectures. (3F, W Sp) **Anderson, Smith, Olsen**

228. Physical Organic Chemistry. Quantitative aspects of organic theory including kinetics and equilibrium studies. Prerequisites: Chem 226, 201. Three lectures. (3W) **Anderson, Olsen**

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229. Theoretical Organic Chemistry. Application of kinetics, thermodynamics and simple quantum mechanics to problems of organic chemistry. Prerequisite: Chem 228. Three lectures. (3Sp) **Smith**

***233. Special Topics in Organic Chemistry.** Current topics in organic chemistry. Prerequisite: Chem 227. Three lectures. (3F) **Anderson**

****234. Chemistry of Natural Products.** Alkaloids, steroids and terpenes with emphasis on biosynthesis. Prerequisite: Chem 227. Three lectures. (3F) **Olsen**

250. Advanced Inorganic Chemistry. Modern topics and theories in inorganic chemistry. Prerequisites: Chem 106, 150. Three lectures. (3W) **Staff**

***251. Coordination Chemistry.** Theory of the coordinated bond and inorganic reaction mechanism. Prerequisite: Chem 250. Three lectures. (3Sp) **Staff**

260. Graduate Seminar. (1F, 1W, 1Sp) **Staff**

272. Advanced Analytical Chemistry. Modern developments in analytical chemistry. Prerequisites: Chem 106, 152, 153. Three lectures. (3Sp) **Spence**

274. Special Topics in Analytical Chemistry. Prerequisites: Chem 106, 152, 153. (3) **Staff**

280. Toxicology. Effect of selected chemical compounds on living organisms. Prerequisites: Chem 190, 195, 122. Three lectures, two labs. (5Sp) **Greenwood**

286. Biochemical Research Techniques. Modern experimental techniques of biochemical research. Prerequisites: Chem 194. Two labs. (Arr) **Staff**

***287. Nucleic Acids and Proteins.** Physical chemistry of macromolecules. Structures of nucleic acids, proteins, and viruses. The relation of biological activity to structure. Prerequisites: Chem 106, 192. Three lectures. (3Sp) **Staff**

288. Special Topics in Biochemistry. Three lectures. (3) **Staff**

289. Animal Metabolism. Feeding experiments involving development of amino acid, vitamin, mineral, and other nutritional deficiencies in blood, urine and other secretions and excretions when indicated. Credit arranged. (F, W, Sp) **Greenwood**

***295. Enzymes.** Enzymes and their functions in plants and animals. Prerequisites: Chem 106, 192. Three lectures. (3W) **Burnham, Farley**

***296. Enzyme Chemistry Laboratory.** The experimental methods of enzyme chemistry including the purification, assay, and isolation of enzymes followed by a study of their kinetics, activity and other properties. Prerequisites: Chem 106, 194. Two labs. (2Sp) **Farley, Burnham**

298. Graduate Research. Credit arranged. (F, W, Sp) **Staff**

Nutrition and Biochemistry Seminar. (See Animal Husbandry 270)

400. Continuing Graduate Advisement. Graduate students who have received maximum thesis credit, but who have not completed the thesis or dissertation, must enroll for a minimum of three credits, until the degree is completed. If the student does not comply, his candidacy may be suspended and his supervisory committee dissolved. (3F, 3W, 3Sp, 3Su.) **Staff**

*Taught 1968-69

**Taught 1969-70

Department of

Geology

HEAD: CLYDE T. HARDY, Professor; PhD, Ohio State University
OFFICE: Main 258

J. STEWART WILLIAMS, Emeritus Professor; PhD, George Washington University; postdoctoral work, Yale University

DONALD R. OLSEN, Associate Professor; PhD, University of Utah

RAYMOND L. KERNS, JR., Assistant Professor; PhD, University of Oklahoma

ROBERT Q. OAKS, JR., Assistant Professor; PhD, Yale University

Geology Courses

Master of Science Degree. The Department of Geology offers advanced study and research leading to the Master of Science degree. Graduate students of other departments may take any course in the 100 series for credit.

GRADUATE AND UNDERGRADUATE COURSES

101. Mineralogy. Identification of minerals by physical and chemical tests. Elementary crystallography. Prerequisites: Geology 3, Chemistry 10, 11. (5W) **Olsen**

102. Optical Mineralogy and Petrography. Determination of minerals by using the petrographic microscope. Classification of igneous rocks. Prerequisites: Geology 101, Physics 19. (3W) **Olsen**

103. Engineering Geology. Application of geology to engineering problems. (3Sp) **Hardy**

105. Sedimentary Geochemistry. Origin of sedimentary rocks with emphasis on chemical environment. (3Sp) **Kerns**

106. Invertebrate Paleontology. Introduction to the study of invertebrate fossils. Methods of preparation. Prerequisites: Geology 4, Zoology 16. (5Sp) **Williams**

107. Minerals and Rocks. Identification of rocks and rock-forming minerals. Prerequisite: Geology 3. (3F) **Olsen**

108. Stratigraphy and Sedimentation. Prerequisite: Geology 3. (5W) **Hardy**

109. Sedimentary Petrology. Classification and origin of sedimentary rocks with emphasis on mineral composition. Prerequisite: Geology 101. (3F) **Kerns**

110. Structural Geology. Prerequisite: Geology 3. (5F) **Hardy**

111. Petroleum Geology. Accumulation and origin of petroleum. Subsurface methods utilized in exploration. Prerequisites: Geology 108, 110. (3W) **Oaks**

113. Economic Geology. Theories of mineral deposition. Genetic classification of mineral deposits. Geologic and geographic occurrence of metallic and non-metallic mineral deposits. Prerequisites: Geology 101, 110. (5Sp) **Olsen**

114. Geologic Field Methods. Preparation of geologic and topographic maps utilizing the

plane table. Measurement of stratigraphic sections. Prerequisites: Geology 3, Civil Engineering 81. (3Sp) **Hardy**

115. Surficial Geology. Processes active on surface of earth, unconsolidated deposits, and geomorphology. Recent geologic events. For majors in Forest Science, Range Science, Engineering, and Soil Science. Prerequisite: Geology 3. (5F) **Williams**

116. Special Problems. Directed study of selected topics. Written report required. (1-6F, W, Sp) **Staff**

117. Ground-Water Geology. Geologic conditions that control the occurrence and purity of ground water with special reference to western United States. Prerequisite: Geology 3. (4W) **Williams**

118. Geologic Field Course. (8Su) **Staff**

130. Photogeology. Interpretation of aerial photographs in geologic mapping. Prerequisites: Geology 110, 115. (3F) **Oaks**

131. X-Ray Mineralogy. Principles and methods of mineral identification by X-Ray diffraction. Prerequisite: Geology 101. (4F) **Kerns**

132. Clay Mineralogy. Structure and environmental significance of clay minerals. Prerequisite: Geology 131. (4W) **Kerns**

133. Exploration Geophysics. Principles of exploration geophysics with emphasis on seismic, gravity, and magnetic methods. Prerequisites: Geology 111, Physics 17. (3Sp) **Oaks**

134. Geomorphology. Quantitative and experimental approach to the study of land forms and associate sedimentary deposits. Emphasis on processes. Prerequisite: Geology 115. (3W) **Oaks**

GRADUATE COURSES

200. Sedimentary Petrography. Classification and description of noncarbonate sedimentary rocks utilizing petrographic microscope. Prerequisite: Geology 102. (2W) **Kerns**

201. Sedimentary Petrography. Classification and description of carbonate sedimentary rocks utilizing petrographic microscope. Prerequisite: Geology 102. (2Sp) **Kerns**

210. Graduate Seminar. (2-5F, W, Sp) **Staff**

212. Paleocology and Biostratigraphy. (3F) **Oaks**

213. Paleozoic Stratigraphy. (3W) **Williams**

214. Mesozoic and Cenozoic Stratigraphy. (3W) **Hardy**

215. **Regional Tectonics.** (3F) **Hardy**
216. **Igneous and Metamorphic Petrography.** Classification and description of igneous and metamorphic rocks utilizing petrographic microscope. Prerequisite: Geology 102. (3Sp) **Olsen**
217. **Igneous and Metamorphic Petrology.** Origin of igneous and metamorphic rocks with emphasis on physical-chemical conditions and processes. Prerequisites: Geology 101, 107. (3F) **Olsen**
219. **Invertebrate Paleontology.** Taxonomic

- invertebrate paleontology exclusive of microfossils. Prerequisite: Geology 106. (3Sp) **Williams**
220. **Thesis.** (5-15, F, W, Sp) **Staff**
400. **Continuing Graduate Advisement.** Graduate students who have received maximum thesis credit, but who have not completed the thesis or dissertation, must enroll for a minimum of three credits, until the degree is completed. If the student does not comply, his candidacy may be suspended and his supervisory committee dissolved. (3F, 3W, 3Sp, 3Su.) **Staff**

Department of

Mathematics

HEAD: NEVILLE C. HUNSAKER, Professor; PhD, Rice University; postdoctoral work, University of Illinois

OFFICE: Engineering C-327

JOE ELICH, Professor; MA, University of California; doctoral work, University of California at Los Angeles

JOHN E. KIMBER, Associate Professor; PhD, Massachusetts Institute of Technology

KONRAD SUPRUNOWICZ, Associate Professor; PhD, University of Nebraska

L. O. CANNON, Assistant Professor; PhD, University of Utah

ROBERT GUNDERSON, Assistant Professor; PhD, University of Alabama

L. DUANE LOVELAND, Assistant Professor; PhD, University of Utah

R. G. NATH, Assistant Professor; PhD, University of Utah

E. E. UNDERWOOD, Assistant Professor; MA, University of Illinois

JAMES D. WATSON, Assistant Professor; PhD, Iowa State University

STANLEY G. WAYMENT, Assistant Professor; PhD, University of Utah

The Department of Mathematics offers a Master of Science degree for superior students. Normally two years of residence are needed to complete the degree unless a transfer of credits has been approved. In addition to departmental approval, minimum requirements include: (a) 18 credits in courses numbered 200 or above, (b) completion of a satisfactory thesis, and (c) satisfactory performance on a comprehensive examination on course work.

Mathematics Courses

GRADUATE AND UNDERGRADUATE COURSES

116. **Modern Algebra.** Prerequisite: 99. (3F) **Staff**
117. **Modern Algebra.** Prerequisite: 116. (3W) **Staff**
118. **Modern Algebra.** Prerequisite: 117. (3Sp) **Staff**
120. **Modern Geometry.** Prerequisite: 98. (3) **Staff**
122. **Ordinary Differential Equations.** Prerequisite: 110. (3) **Staff**

123. **Number Theory.** Prerequisite: 99. (3) **Staff**
124. **Foundations of Mathematics.** Prerequisite: 98. (3) **Staff**
126. **Numerical Methods.** Prerequisite: 110. (3F) **Staff**
127. **Introduction to Numerical Analysis.** Prerequisite: 126. (3W) **Staff**
128. **Introduction to Numerical Analysis.** Prerequisite 127. (3S) **Staff**
130. **Advanced Calculus.** Prerequisite: 110. (3F) **Staff**
131. **Advanced Calculus.** Prerequisite: 130. (3W) **Staff**
132. **Advanced Calculus.** Prerequisite: 131. (3Sp) **Staff**
134. **Elementary Metric Topology.** Prerequisite: 99. (3) **Staff**
153. **Mathematical Readings.** Prerequisite: 99. **Staff**
160. **Determinant and Matrix Theory.** Prerequisite: 99. (3) **Staff**
161. **Calculus of Probability.** Prerequisite: 99. (5F) **Staff**
162. **Mathematics of Statistics.** Prerequisite: 99 and 161. (5W) **Staff**
163. **Mathematics of Statistics.** Prerequisite: 162. (5Sp) **Staff**
227. **Numerical Analysis.** Prerequisite 226. (3W) **Staff**
228. **Numerical Analysis.** Prerequisite 227. (3S) **Staff**
234. **Topology.** Prerequisite: 132 (3F) **Staff**
235. **Topology.** Prerequisite: 234. (3W) **Staff**
236. **Topology.** Prerequisite: 235. (3Sp) **Staff**
246. **Tensor Analysis.** Prerequisite: 145. (3) **Staff**
- *247. **Differential Geometry.** Prerequisite: 246. (3W) **Staff**
- *248. **Differential Geometry.** Prerequisite: 247. (3S) **Staff**
250. **Graduate Seminar.** (1F, 1W, 1Sp) **Staff**
251. **Real Variables.** Prerequisite: 132. (3F) **Staff**
252. **Real Variables.** Prerequisite: 251. (3W) **Staff**
253. **Real Variables.** Prerequisite: 252. (3Sp) **Staff**
254. **Theory of Functions.** Prerequisite: 132. (3F) **Staff**
255. **Theory of Functions.** Prerequisite: 254. (3W) **Staff**
256. **Theory of Functions.** Prerequisite: 255. (3Sp) **Staff**
257. **Advanced Applied Mathematics.** Prerequisite: 132. (3) **Staff**
258. **Advanced Applied Mathematics.** Prerequisite: 257. (3) **Staff**
259. **Advanced Applied Mathematics.** Prerequisite: 258. (3) **Staff**
260. **Graduate Thesis.** Credit arranged (F, W, Sp) **Staff**
400. **Continuing Graduate Advisement.** Graduate students who have received maximum thesis credit, but who have not completed the thesis or dissertation, must enroll for a minimum of three credits, until the degree is completed. If the student does not comply, his candidacy may be suspended and his supervisory committee dissolved. (3F, 3W, 3Sp, 3Su.) **Staff**

GRADUATE COURSES

- **216. **Topics in Abstract Algebra.** Prerequisite: 118. (3F) **Staff**
- **217. **Topics in Abstract Algebra.** Prerequisite: 216. (3W) **Staff**
- **218. **Topics in Abstract Algebra.** Prerequisite: 217. (3Sp) **Staff**
- *220. **Advanced Topics in Algebra.** Prerequisite 218. (3F) **Staff**
- *221. **Advanced Topics in Algebra.** Prerequisite 220. (3W) **Staff**
- *222. **Advanced Topics in Algebra.** Prerequisite 221. (3S) **Staff**
226. **Numerical Analysis.** Prerequisite 128. (3F) **Staff**

*Taught 1968-69

**Taught 1969-70

Department of

Physics

HEAD: W. FARRELL EDWARDS, Associate Professor; PhD, California Institute of Technology

OFFICE: Engineering 154

JOHN K. WOOD, Professor; PhD, Pennsylvania State University

JACK E. CHATELAIN, Associate Professor; PhD, Lehigh University

JOHN J. MERRILL, Associate Professor; PhD, California Institute of Technology

AKELEY MILLER, Associate Professor; PhD, University of Missouri

JAY O. JENSEN, Assistant Professor; BS, Utah State University; graduate work, Utah State University and University of Oregon

V. GORDON LIND, Assistant Professor; PhD, University of Wisconsin

ROBERT E. MCADAMS, Assistant Professor; PhD, Iowa State University

O. HARRY OTTESON, Assistant Professor; PhD, Utah State University

WILLIAM R. PENDLETON, Assistant Professor; PhD, University of Arkansas

Master of Science Degree. A candidate for the degree of Master of Science in Physics must take an entrance examination administered by the Department prior to registration. A student may be required to register for one or more undergraduate courses in order to correct any deficiencies which appear upon analysis of the student's work on this examination. The candidate is also required to take a comprehensive examination, administered by the Department, during the Spring quarter of the student's first year of residence. This examination covers undergraduate and first-year graduate physics with an emphasis upon mechanics, electromagnetic theory and quantum mechanics, especially in its coverage of first-year graduate physics. A candidate is also required to complete at least two of the first-year graduate courses in these three subjects. In addition, the student will submit either a thesis or a research report at the discretion of the student's supervisory committee. A total of up to 15 credit hours may be ac-

cumulated toward the Master of Science degree credit requirements for the research work leading to the thesis or research report.

Doctor of Philosophy Degree. The Physics Department in cooperation with related departments offers the Doctor of Philosophy degree. A brief summary of the Philosophy Degree program in Physics includes the following: An entrance exam prior to registration; at least one year in residence at the Logan campus; a qualifying exam over undergraduate and first year graduate physics during spring quarter of the first year; a comprehensive exam with emphasis on Quantum Mechanics, Electricity and Magnetism and Classical Mechanics usually at the completion of the second year; an examination conducted by the Language Department in German, French, or Russian; a thesis and a thesis defense, credit requirements are 135 hours and may include (in addition to recommended courses) up to 45 hours for the thesis, transfer credit (determined on an individual ba-

sis), and credit for preliminary thesis research.

Biophysics. Advanced work in biophysics is offered in the Physics Department in cooperation with the biological science departments. Students interested in this program should write to the Physics Department or Zoology Department for information. Certain undergraduate courses in mathematics, physics, chemistry, and biology are prerequisite to this program and students are expected to make up deficiencies.

Physics Courses

GRADUATE AND UNDERGRADUATE COURSES

122. Modern Physics. For engineering, science, and teaching majors. (3F) **Jensen**

125, 126, 127. Modern Physics. Application of special relativity and quantum mechanics to atomic structure, molecular physics, solid state physics, X-rays and nuclear physics. Prerequisite: Physics 155 or 177. Three lectures, one recitation. (4F, W, Sp) **Staff**

130. Nuclear Physics. A survey of methods and results of recent investigations of nuclear processes. To follow Physics 122. (3Sp) **Staff**

131. Nuclear Detection Methods. Designed to familiarize the student with the instruments, techniques of measurement, and elements of health safeguards used in nuclear physics. (2F, W, Sp) **Staff**

143. Radiobiology. Designed to acquaint students in Medical Technology, Botany, Zoology, Pre-medicine, Pre-veterinary and Agriculture with a foundation of techniques in health physics, radiation monitoring and measuring and isotope handling. Prerequisite: One quarter of general physics. (3) **Jensen**

153, 154, 155. Analytical Mechanics. Prerequisite: Differential Equations. (3F, 3W, 3Sp) **Staff**

156, 157, 158. Introduction to the Theory of Relativity. An introduction to the foundations, formulations and predictions of the special theory of Relativity and applications to Modern Physics. Advanced courses in Mechanics and Electricity considered helpful but not necessary. (2F, 2W, 2Sp) **Staff**

***160, 161, 162. Thermal Physics.** A study of theoretical models devised to correspond with the observed behavior of matter in bulk in terms of heat and energy. (3F, 3W, 3Sp)

Staff

****166, 167, 168. Wave Theory and Optics.** Three-quarter sequence covering optics and related topics. Emphasis on wave motion and diffraction phenomena; also geometrical optics, aberrations, interference, polarization, X-ray optics, and atomic spectra. Three lectures. (3F, 3W, 3Sp) **Staff**

175, 176, 177. Electricity and Magnetism. Electrostatics, magnetostatics, DC and AC circuits, electromagnetism, and electromagnetic theory. Use of the calculus and differential equations. (3F, 3W, 3Sp) **Miller**

181. Mechanics Laboratory. A one quarter course including experiments on linear and non-linear oscillatory motion with and without coupling and experiments on elastic behavior of bodies. Makes use of calculus and some differential equations. Prerequisite: concurrent or previous registration in Physics 153. (1F) **Staff**

182. Electricity and Magnetism Laboratory. A one quarter course including experiments with direct and alternating current bridges, experiments to examine the mechanical and electrical details of galvanometer and other meter behavior, and experiments concerning feedback and filter and other transfer properties. Makes use of calculus and some differential equations. Prerequisite: concurrent or previous registration in Physics 175. (1W) **Staff**

183. Atomic Physics Laboratory. A one quarter course including experiments in Atomic Physics such as measurement of electronic charge by the Millikan oil drop experiment and the Franck and Hertz experiment. Makes use of calculus and some differential equations. Prerequisite: concurrent or previous registration in Physics 153. (1Sp) **Staff**

184. Optics Laboratory. A one quarter course including advanced experimental work in optics such as refraction in inhomogeneous media, diffraction, polarization, photometry, spectra, information retrieval. Prerequisite: concurrent or previous registration in Physics 166. (1W) **Staff**

188. Special Problems in Experimental Physics. A laboratory course to give the advanced student experience with precision instruments and their use in physics. 1 to 3 per quarter. (F, W, Sp) **Staff**

****Taught 1968-69**

****Taught 1969-70**

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- 196, 197, 198. **Selected Reading in Physics.** (1F, 1W, 1Sp) **Staff**
- 200, 201, 202. **Study of the Structure and Properties of Solids.** These include elastic, thermal, electric and magnetic properties. Considerable time is devoted to the study of conductors and semiconductors (especially germanium and silicon). Prerequisites: Physics 127, 177, and 162 or permission of the instructor. Concurrent registration in Physics 260 is recommended. (3F, W, S—offered every other year.) **McAdams**
- 204, 205, 206. **Invited Lectures.** A series of invited lectures on specialized topics in physics and related subjects. (1F, W, S) **Staff**
- 210, 211. **X-Ray Diffraction and X-Ray Crystallography.** (3F, 3Sp) **Wood, Miller**
214. **Soil Physics.** (See Plant Science 214.)
- 220, 221, 222. **Atomic Spectra, Molecular Spectra, and Spectrographic Measurements.** (3F, 3W, 3Sp) **Staff**
- 230, 231, 232. **Nuclear Physics.** (3F, 3W, 3Sp) **Staff**
250. **Research in Physics.** Credit arranged. (F, W, Sp) **Staff**
- 260, 261, 262. **Thermodynamics, Kinetic Theory, Statistical Thermodynamics.** (3F, 3W, 3Sp) **Staff**
- 270, 271, 272. **Quantum Field Theory.** (3F, 3W, 3Sp) **Chatelain**
- 275, 276, 277. **Relativity and Cosmology** (3F, 3W, 3S) **Staff**
- 285, 286, 287. **Introductory Quantum Mechanics.** Prerequisite: Advanced Calculus. (3F, 3W, 3Sp) **Staff**
288. **Introductory Quantum Mechanics.** Continuation of 287. (3F) **Staff**
- 290, 291, 292. **Theoretical Mechanics.** (3F, 3W, 3Sp) **Staff**
- 293, 294, 295. **Graduate Seminar.** Advanced topics in physics on specialized subjects to specially train the student in his graduate research. Credit arranged. (F, W, Sp, Su) **Staff**
- 296, 297, 298. **Theoretical Electricity and Magnetism.** (3F, 3W, 3Sp) **Staff**
400. **Continuing Graduate Advisement.** Graduate students who have received maximum thesis credit, but who have not completed the thesis or dissertation, must enroll for a minimum of three credits, until the degree is completed. If the student does not comply, his candidacy may be suspended and his supervisory committee dissolved. (3F, 3W, 3Sp, 3Su.) **Staff**

Department of

Zoology

(Zoology, Entomology, Physiology)

HEAD: DATUS M. HAMMOND, Professor; PhD, University of California; postdoctoral work, University of Munich and University of Bonn

OFFICE: Forestry and Zoology 117

THOMAS L. BAHLER, Professor; PhD, University of Wisconsin; National Science Foundation postdoctoral fellowship at University of Miami and University of Michigan

DONALD W. DAVIS, Professor; PhD, University of California; postdoctoral work, Ohio State University

KEITH L. DIXON, Professor; PhD, University of California

ELDON J. GARDNER, Professor; Dean, School of Graduate Studies; PhD, University of California; postdoctoral work, University of California

B. AUSTIN HAWS, Professor and Coordinator of Latin American Affairs; PhD, Iowa State University

- GEORGE F. KNOWLTON, Emeritus Professor and Extension Specialist; PhD, Ohio State University; postdoctoral work, University of Minnesota
- WILLIAM F. SIGLER, Professor and Head, Department of Wildlife Resources; PhD, Iowa State University
- LE GRANDE C. ELLIS, Associate Professor; PhD, Oklahoma State University; postdoctoral work, University of Utah
- WARREN C. FOOTE, Associate Professor; PhD, University of Wisconsin
- MERRILL H. GUNNELL, Associate Professor; MS, Utah State University; doctoral work, College of Pacific, University of Wyoming, and Oregon State University
- GENE H. LINFORD, Associate Professor; MS, University of Utah; doctoral work, University of California and University of Utah
- RAYMOND T. SANDERS, Associate Professor; PhD, Stanford University; postdoctoral work, Uppsala University, Sweden
- JOHN R. SIMMONS, Associate Professor; PhD, California Institute of Technology; postdoctoral work, Stanford University
- JAMES T. BOWMAN, Assistant Professor; PhD, University of California
- WILLIAM A. BRINDLEY, Assistant Professor; PhD, Iowa State University
- WILFORD J. HANSON, Assistant Professor; MS, University of Kansas; doctoral work, University of Kansas and Gorgas Memorial Institute, Panama
- TING H. HSIAO, Assistant Professor; PhD, University of Illinois
- REED S. ROBERTS, Assistant Professor and Extension Entomologist; MS, Utah State University; doctoral work, University of Utah and University of Kansas
- HUGH P. STANLEY, Assistant Professor; PhD, Oregon State University; postdoctoral work, Naples Zoological Station, Cornell University and University of Washington
- Collaborators:* GEORGE E. BOHART, PhD; GERALD D. GRIFFIN, PhD; EDSSEL C. JORGENSEN, MS; WILLIAM P. NYE, MS; HEBER F. THORNLEY, MS

Master of Science Degree: The Zoology Department offers a Master of Science degree in various phases of Agricultural Entomology, Genetics, Medical Entomology, Systematic Entomology, Physiology, Parasitology, Mammalogy, Ornithology, and Herpetology.

Doctor of Philosophy Degree. Cooperatively with related departments, advanced study and research is offered for the attainment of the degree of Doctor of Philosophy in specialized fields of Zoology, Entomology and Physiology. Further information may be obtained from the Department or from the Dean of the School of Graduate Studies.

A training program in Genetics sponsored by a grant from the National Institutes of Health is now being conducted; research fellowships are offered in connection with this program.

Zoology Courses

GRADUATE AND UNDERGRADUATE COURSES

101. **Invertebrate Zoology.** The more important phyla of invertebrates, with some consideration of the local fauna. **Prerequisites:** Zoology 16 or equivalent. Three lectures, two labs. (5Sp) Staff

107. **History and Literature of Biology.** The more important men and ideas in the historical development of biology. (4F) Gardner

200 College of Science

112. Principles of Genetics. A beginning course dealing with the basic principles of genetics. Illustrative materials is taken from animals, plants and man. Prerequisite: Zoology 16 or equivalent or Botany 26. Four lectures, one lab. (5F, W, Sp) **Staff**

116. Parasitology. Protozoa and worms parasitic in man, domestic animals and wild animals, and relationships between parasites and their hosts. Prerequisite: Zoology 16 or equivalent. Three lectures, two labs. (5Sp) **Bahler, Hammond**

118. Vertebrate Embryology. An introduction to the principles of development of the vertebrates. Prerequisite: Zoology 16 or equivalent. Three lectures, two labs. (5Sp) **Stanley**

119. Comparative Anatomy. Fundamentals of structure of the main types of vertebrates are studied comparatively. Prerequisite: Zoology 16 or equivalent. Three lectures, two labs. (5W) **Dixon**

121. Ornithology. Structure, classification, distribution and annual cycles of birds, with emphasis on study of the local fauna in the field. Prerequisite: Zoology 16 or equivalent. Two lectures, two labs. (4Sp) **Dixon**

122. Mammalogy. Structure, classification, life histories and distribution of mammals; introduction to methods of field investigation. Prerequisite: Zoology 16 or equivalent. Two lectures, two labs. (4F) **Dixon**

123. Field Zoology. Study of the most common Utah animals, including identification, natural history, distribution, ecology, etc. Also methods of study in the field, and collection and preparation of specimens for study, display and storage are considered. Some laboratory time is spent in making observations and collections in the field. Prerequisites: Zoology 16 or equivalent. Two lectures, two labs. (4F) **Linford**

127. Cytology. Study of cells, both plant and animal, including techniques of study and subcellular organization. Prerequisite: Organic Chemistry. Three lectures, two labs. (5F) **Stanley, Sanders**

128. Elements of Histology. Study of tissues, including characteristics of different kinds of tissues and the main organs. Four lectures, one lab. (5F) **Bahler**

129. Histological Technique. Techniques employed in making preparations of animal tissues for microscopic study. Three labs. (3Sp) **Staff**

132. Mechanics of Evolution. Critical study of the facts and theories pertaining to the biological principles of evolution, with emphasis

on how it occurs including some consideration of population genetics. Prerequisites: Zoology 112 and Zoology 16 or equivalent, or Botany 26. Three lectures. (5Sp) **Bowman**

150. Herpetology. Classification, distribution, life habits, and identification of amphibians and reptiles, with emphasis on the local forms. Prerequisite: Zoology 16 or equivalent. Two lectures, two labs. (4F) **Gunnell**

155. Ichthyology. Ecology, classification, and life histories of native and introduced fishes. Three lectures, two labs. (5W) **Sigler**

GRADUATE COURSES

201. Special Problems. Individual study of a problem under the guidance of a staff member. Credit arranged. (F, W, Sp) **Staff**

205. Orientation for Graduate Students. Introduction to procedures in graduate study; qualifying examinations, scientific method, selection of problem, becoming acquainted with literature, organization and writing of thesis and final examination. Required of all graduate students in Zoology, Entomology, Physiology. (1F) **Staff**

207. Theoretical Biology. A critical study of modern biological thought. (3W) **Sanders**

***211. Genetics of Lower Organisms.** Concepts of genetic structure, function, and recombination in lower organisms with emphasis on current literature. Prerequisite: Zoology 112. Three lectures. (3Sp) **Simmons**

****212. Biochemical Genetics.** Concepts of genetic function at the chemical and molecular level, with emphasis on current literature. Prerequisites: Zoology 112; Chemistry 123; recommended, Chemistry 190. Three lectures. (3Sp) **Simmons**

***214. Current Topics in Genetics.** Intensive study of heredity and variation with emphasis on current research. Prerequisite: Zoology 112. May be repeated for credit with consent of the instructor. (3W) **Bowman**

****215. Genetics of Drosophila and Maize.** Concepts of genetic structure, function and recombination in higher organisms, with emphasis on current literature. Prerequisite: Zoology 112. Three lectures. (3W) **Bowman**

224. Biological Electron Microscopy. Theory and practice of techniques for the preparation of biological materials for study with the electron microscope. One lecture, two labs. (3F) **Stanley**

*Taught 1968-69

**Taught 1969-70

Entomology

GRADUATE AND UNDERGRADUATE COURSES

225. **Advanced Topics in Morphogenesis.** A consideration of selected problems in morphogenesis and other aspects of developmental biology. Prerequisite: Zoology 118. (3W) **Stanley**

233. **Zoogeography.** Principles governing the distribution of animals, with emphasis on terrestrial vertebrates, and the history of the biota of western North America from the beginning of the Cenozoic era. (3W) **Dixon**

235. **Protozoology.** The protozoa, with emphasis in parasitic forms, and on the methods of studying the protozoa. Consideration is also given to free-living protozoa and to classification, morphology, physiology, and reproduction of the protozoa in general. Two lectures, two labs. (4W) **Hammond**

236. **Advanced Parasitology.** Detailed study of certain parasitic protozoa and helminths, with emphasis on current research. Prerequisite: Zoology 116. (2Sp) **Hammond**

240. **Research and Thesis.** Research connected with problem undertaken for partial fulfillment of requirement for Master of Science or PhD degree. Credit arranged. (F, W, Sp) **Staff**

261, 262. **Seminar in Vertebrate Zoology.** Required of all graduate students in Vertebrate Zoology each fall and winter quarter while in residence. Seniors and others interested may participate with the permission of the instructor. (1F, 1W) **Dixon**

271, 272, 273. **Seminar in Genetics.** Required of all graduate students in Genetics each fall, winter and spring quarter while in residence. Seniors and others interested may participate with the permission of the instructor. (1F, 1W, 1Sp) **Gardner, Simmons, Bowman**

281, 282, 283. **Seminar in Parasitology.** Required of all graduate students in Parasitology each fall, winter and spring quarter while in residence. Seniors and others interested may participate with permission of instructor. (1F, 1W, 1Sp) **Hammond**

291, 292, 293. **Seminar in Developmental Biology.** Required of all graduate students in Developmental Biology each fall, winter, and spring quarter while in residence. Seniors and others interested may participate with permission of instructor. (1F, 1W, 1Sp) **Stanley**

400. **Continuing Graduate Advisement.** Graduate students who have received maximum thesis credit, but who have not completed the thesis or dissertation, must enroll for a minimum of three credits, until the degree is completed. If the student does not comply, his candidacy may be suspended and his supervisory committee dissolved. (3F, 3W, 3Sp, 3Su.) **Staff**

100. **Systematic Entomology.** Classification of insects. Insect collection required. Prerequisite: Entomology 13. One lecture, one lab and field collecting. (3F) **Hanson**

101. **Principles of Animal Taxonomy.** A study of the principles of classification of animals and the rules of zoological nomenclature. Prerequisite: Entomology 100 or Zoology 16, or equivalents. Two lectures. (2W) **Hanson**

102. **Advanced Systematic Entomology Laboratory.** Advanced study of the classification of insects, including practice in the preparation of keys, description of species, and scientific illustration. Prerequisite: Entomology 100. This course must be taken concurrently with Entomology 101. One lab. (1W) **Hanson**

****105. Forest Entomology.** Ecology, life history, identification and economic importance of major forest insect species. Beneficial and harmful insects, and general problems of forest insect control are discussed. Two lectures, two labs. (4F) **Davis**

108. **Agricultural Entomology.** Insect pests of major economic importance to agriculture, including their recognition, type of damage done, distribution, life history, and methods of control. Three lectures, two labs. (5F) **Davis**

111. **Insect Morphology.** Structure of insects, including external and internal anatomy. Prerequisite: Entomology 13. Three lectures. Two labs. (5F) **Staff**

112. **Insect Physiology.** Function of the organ systems of insects. Prerequisite: Entomology 111. Three lectures, two labs. (5W) **Brindley**

115. **Medical and Veterinary Entomology.** A study of Arthropods that annoy and transmit agents of disease to man and domesticated and wild animals. Vectors of plague, spotted fever, tularemia, malaria and other Arthropods carrying disease receive major attention. Prerequisite: Zoology 16 or equivalent. Two lectures, two labs. (4W) **Hanson**

***120. Insect Pollination in Relation to Agriculture.** Pollinating insects in agriculture, including beekeeping as related to crop pollination, utilization of native pollinating insects, and special problems in the pollination of many commercial crops. (2W) **Bohart**

*Taught 1968-69

**Taught 1969-70

****130. Nematology.** Recognition, distribution, host and environmental relations, and control of nematodes with emphasis on plant parasitic forms. Prerequisite: Zoology 16 or equivalent. (3W) **Staff**

138. Aquatic Entomology. Identification, distribution, life histories and adaptations of aquatic insects, with particular reference to local streams and lakes. Two lectures, one lab. (3Sp) **Hanson**

GRADUATE COURSES

206. Insect Ecology. Ecological principles as applied to insects, including fundamental concepts of ecology, ecological relationships, and measurement of ecological factors of importance in Entomology. The impact of changes in environmental conditions on insect populations also are considered. Prerequisites: Zoology 16 or equivalent, Entomology 13, and Wildlife Resources 160. (3W) **Hsiao**

210. Special Problems. Individual study under staff guidance. Prerequisite: Entomology 13, 100, 108. Credit arranged. (F, W, Sp) **Staff**

****212. Advanced Insect Physiology.** A detailed study of the biochemical and biophysical aspects of the organ systems of insects. Prerequisites: Entomology 112 and Chemistry 180 or equivalent. (3Sp) **Brindley**

***213. Insect Toxicology.** An introduction to the principles of toxicology as applied to the control of insects, including molecular structure of insecticides as related to toxicity mode of action of insecticides, resistance of insects to insecticides, and problems of residues. Prerequisites: Ent 112 or Physiol 151, and organic chemistry or biochemistry, or equivalents. Three lectures, two labs. (5Sp) **Brindley**

****231. Biological Control of Insect Pests.** Study of invertebrate parasites and predators of insects. Consideration is also given to diseases of insects, vertebrate predators, and destruction of undesirable plants by insects. Prerequisite: Entomology 13 or 108. Two lectures, one lab. (3W) **Davis**

250. Research and Thesis. For research connected with problem undertaken for partial fulfillment of requirements for Master of Science or PhD degree. Credit arranged. (F, W, Sp) **Staff**

261, 262, 263. Seminar in Entomology. Required of all graduate students in Entomology each fall, winter and spring quarter while in residence. Seniors in Entomology and others interested may participate with the permission of the instructor. (1F, 1W, 1Sp) **Staff**

400. Continuing Graduate Advisement. Graduate students who have received maximum thesis credit, but who have not completed the thesis or dissertation, must enroll for a minimum of three credits, until the degree is completed. If the student does not comply, his candidacy may be suspended and his supervisory committee dissolved. (3F, 3W, 3Sp, 3Su.) **Staff**

Physiology

GRADUATE AND UNDERGRADUATE COURSES

104. Advanced Human Physiology. A survey of the systems of man with emphasis on the functions of the circulatory, nervous and muscular systems. Designed primarily for students with teaching majors in the biological sciences. Prerequisites: Physiology 4, Zoology 16 or equivalent, Chemistry 12. Three lectures, two labs. (5Sp) **Staff**

121, 122. Mammalian Physiology. An intensive and detailed two-quarter course in physiology in which the functions of each of the organ systems of man and animals is studied. Students may not register for 122 without having had 121. As preparation, Zoology 16 or equivalent, Chemistry 3, 4, 5, 121, 122, 123A or equivalent and a course in physics are required. Three lectures, two labs. (5F, 5W) **Ellis**

130. Cellular Physiology. A study of physiological functions at the cellular level. Prerequisites: Physiology 4 or its equivalent, Chemistry 121 and 122, and Physics 17, 18 and 19 or equivalent. Three lectures, two labs. (5W) **Sanders**

141. Endocrinology. A study of the ductless glands and their secretions. Emphasis is placed on the action of these hormones on growth, metabolism, and adaptation of animals to changes in their internal and external environments. Prerequisites: Zoology 16 or equivalent, Physiology 4, and a course in organic chemistry. Three lectures, one lab. (4Sp) **Ellis**

142. Physiology of Reproduction. A study of the physiology of reproduction in mammals. Prerequisites: Zoology 16 or equivalent, Physiology 4 or Veterinary Science 20, and a course in organic chemistry; Physiology 141 recommended. Two lectures, one lab. (3W) **Foot**

*Taught 1968-69

**Taught 1969-70

151. **Comparative Physiology.** A comparative study of organ function in the animal kingdom. Prerequisite: Physiology 121, 122 or 130. Three lectures, two labs. (5Sp) Sanders

GRADUATE COURSES

261. **Physiology of Response.** Nerve-muscle. A detailed physiological study of neuro-muscular mechanisms of response in the animal kingdom. Prerequisites: Physiology 122 or 130, Chemistry 190, Physics 19 or equivalents. Two lectures, one lab. (3F) Sanders

271, 272, 273. **Readings in Physiology.** Reading and reporting of classical and current literature in Physiology. Required of all Physiology graduate students each quarter while in residence. Seniors in Physiology and others may enroll with the permission of the instructor. (1F, 1W, 1Sp) Staff

281, 282, 283. **Seminar in Physiology.** Required of all Physiology students each fall, winter and spring quarter while in residence. Seniors in Physiology and others may enroll with the permission of the instructor. (1F, 1W, 1Sp) Staff

291. **Research and Thesis.** Research connected with problem undertaken for partial fulfillment of requirements for Master of Science or PhD degree. Credit arranged. (F, W, Sp) Staff

400. **Continuing Graduate Advisement.** Graduate students who have received maximum thesis credit, but who have not completed the thesis or dissertation, must enroll for a minimum of three credits, until the degree is completed. If the student does not comply, his candidacy may be suspended and his supervisory committee dissolved. (3F, 3W, 3Sp, 3Su.) Staff

Summer Quarter

DIRECTOR: ELLVERT H. HIMES, PhD, University of Utah

OFFICE: Main 130

Dates: June 17-August 23, 1968

First Session—June 17-July 19

Second Session—July 21-August 23

The Summer Quarter at Utah State University is more than just the fourth quarter of the University's program of academic and cultural offerings. It is unique in that special programs are devised for early admission to the University, continuing undergraduate education, and significant professional advancement in specialized fields of endeavor.

The Summer Quarter is divided into two sessions of five weeks each. It also provides for numerous short workshops, seminars, clinics, and institutes. Conferences are held for which credit is offered. The graduate student may complete requirements for a Master's degree in three summers; the doctoral candidate will find rich selection to supplement a high-level program.

Numerous challenges and cultural advantages are offered during the Summer Quarter. Recitals, concerts, dramas, and special lectures encourage individuals of all ages in creative work and development of individual talents.

The highly qualified resident faculty of Utah State University is

augmented in the summer by distinguished visiting professors of national and international reputation.

A distinguishing feature of the Summer Quarter is the carefully planned and carried out program of recreational enrichment. The Director of Recreation supplies all students opportunities in their various interest fields for out-of-class activities on a regular, yet informally scheduled, basis. University-wide programs are planned that provide activities both on the campus and in the coolness and convenience of the nearby canyons.

Contests and tournaments are conducted both on the campus and in the Utah State Union. The new Student Union supplies numerous outlets for recreation and relaxation.

The location of Utah State University, with its climate and scenic canyons, nearby national parks and monuments, provides special inducements for comfortable and enjoyable study for collegiate education at all levels.

Research Programs

VICE PRESIDENT FOR RESEARCH: D. WYNNE THORNE, PhD, Iowa State University

OFFICE: Main 127

K. W. HILL, Director, Agricultural Experiment Station; PhD, University of Nebraska

CLAYTON CLARK, Director, Engineering Experiment Station; PhD, Stanford University

JAY M. BAGLEY, Director, Utah Water Research Laboratory; PhD, Stanford University

ELDON J. GARDNER, Dean, School of Graduate Studies; PhD, University of California

JAMES P. SHAVER, Chairman, Bureau of Educational Research; EdD, Harvard University

D. WYNNE THORNE, Chairman of Board, Utah State University Foundation

C. WAYNE COOK, Assistant Dean in Charge of Research, College of Natural Resources; PhD, The Agricultural-Mechanical College of Texas

JESSOP B. LOW, Leader, Utah Cooperative Wildlife Research Unit; PhD, Iowa State University

ROBERT KRAMER, Leader, Utah Cooperative Fishery Unit; PhD, University of Minnesota

N. KEITH ROBERTS, Director, Economics Research Institute; PhD, University of Kentucky

JOHN NEUHOLD, Acting Director, Ecology Center; PhD, Utah State University

DEAN F. PETERSON, Director, Utah Center for Water Resources Research; DCE, Rensselaer Polytechnical Institute

JOHN HUNT, Chairman, Institute for Research on Outdoor Tourism; MSF, University of Idaho

ELDON J. GARDNER, Acting Chairman, Center for Pollution Research; PhD, University of California

J. ALAN WAGAR, Leader, Utah Cooperative Forest Recreation Research Unit; PhD, University of Michigan

DORAN J. BAKER, Director, Electro-dynamics Laboratories; PhD, University of Utah

WADE H. ANDREWS, Chairman, Institute for Social Science Research; PhD, Michigan State University

Utah State University was among the first of the colleges and universities in the Intermountain area to have a research program. Originally the research was principally in agriculture. Now research projects are in every college and almost every department of the University.

Research is closely associated with teaching and student activi-

ties. Most of it is conducted by staff members who are also employed to teach part of their time.

Many graduate students are employed to assist in research. The experience thus gained by students is an important part of their education.

Research affiliated with the University is under the general administration of the Vice Presi-

dent for Research. Actual research operations are in several organizations. A more detailed discussion of the principal organizations and areas of research can be found in the University General Catalog.

Policies on research and requests for support are reviewed by the University Research Council. Present members of the Council and the area each represents are: Wynne Thorne, Chairman; M. R.

Merrill, Eldon J. Gardner, Ex-Officio Members; Vearl R. Smith, Agriculture; Bartell C. Jensen, Business and Social Sciences; James P. Shaver, Education; Doran J. Baker, Engineering; Norma H. Compton, Family Life; Austin Fife, Humanities and Arts; C. Wayne Cook, Natural Resources; Grant Gill Smith, Science; Kenneth W. Hill, Agricultural Experiment Station; and Jay M. Bagley, Utah Water Research Laboratory.

Extension Services

DIRECTOR: W. H. BENNETT, PhD, University of Wisconsin
OFFICE: Agricultural Science 221

LLOYD A. DRURY, Associate Director; EdD, University of Wyoming
LLOYD R. HUNSAKER, Associate Director; PhD, University of Minnesota
MARDEN BROADBENT, District Director (Provo); PhD, University of Wisconsin
WILLIAM F. FARNSWORTH, District Director (Logan); PhD, University of Wisconsin

Utah State University's Extension Services include four divisions—Cooperative Extension Service, Extension Classes, Conferences and Institutes, and Correspondence Study.

Through its Extension Class Division, Utah State University Extension Services offers numerous graduate courses in selected centers over the state. These permit students to progress in advanced degree programs preparatory to

completing requirements in residence on the Logan campus. These services are fully accredited by the National University Extension Association.

District offices at Logan and Provo, area offices at Salt Lake City and Richfield and county offices in all of the counties with the exception of Daggett and Grand are centers of service. Here students may obtain catalogs, class schedules, graduate forms and other information.

International Programs

DIRECTOR, INTERNATIONAL PROGRAMS (Effective September 1968):

J. CLARK BALLARD; PhD, Cornell University

OFFICE: Library 202

DARYL CHASE, Emeritus President, Chairman of Board of Governors, Center for the Study of the Causes of War and Conditions for Peace; PhD, University of Chicago

BRUCE H. ANDERSON, Director, Inter-American Center for the Integral Development of Water and Land Resources, Merida, Venezuela; DEngr, University of California

B. AUSTIN HAWS, Chief of Party, USU-USAID Team in Bolivia (Effective September 1968); PhD, Iowa State University

GEORGE J. SEELEY, Acting Chief of Party, USU-USAID Project at Natal, Rio Grande do Norte, Brazil; MBA, Utah State University

R. WELLING ROSKELLEY, Analyst for Southeast Asia, CIC-AID, Rural Development Research Project; PhD, University of Wisconsin

LEROY A. BLASER, Chairman, East-West Institute; EdD, University of California

Utah State University has a cosmopolitan campus with more than 500 students from 50 foreign countries in attendance. More than half of these international students are working on advanced degrees.

USU is directing its major international programs toward Latin America, although assignments are being pursued in other parts of the world by USU faculty members. Other educational programs designed to further international understanding include: the Center for the Study of the Causes of War and the Conditions for Peace, the East-West Institute, an Analytical Study of USAID University Projects, and Peace Corps Training projects.

The Center for the Study of the Causes of War and Conditions for Peace was established to focus the attention of the academic community on the issues and ideas contained in man's ageless search for peace. This Center serves to stimulate research studies, to assemble

a comprehensive library of books and periodicals relating to the causes of war and conditions for peace, to provide a meaningful dialogue between scholars and leaders in the various areas of international relations, to publish papers relating to the purposes of the Center, and to utilize the processes of education to promote the peaceful ordering of human affairs. The Center sponsors an annual convocation, graduate and undergraduate classes, and periodic seminars and institutes.

Graduate students from USU have participated in several of the USU projects in Brazil, Bolivia, Venezuela and Mexico. For example, one master's candidate completed course work on the Logan campus learning techniques which he later applied to a llama study in Bolivia. His thesis research in South America was aided by a Bolivian who had completed requirements for a PhD in Animal Science at USU.

The Rural Industrial Technical Assistance (RITA) project in Brazil provides for a two-way exchange of graduate students. USU faculty members and students have spent two summers in Brazil working with Brazilian counterparts at the University of Rio Grande do Norte and with local Brazilian businessmen on the development of new small businesses. Also two groups of Brazilians have come to USU for academic and practical studies of the businesses selected for establishment in Brazil.

Three levels of planners and implementers, including top government officials, are trained at the Inter-American Center for the Integral Development of Water and Land Resources. This Center (commonly known in Latin America as CIDIAT) is operated for the Organization of the American States by USU in cooperation with the University of the Andes. In addition to conducting courses at Merida, Venezuela, for leaders from the 23 member nations of the OAS, the CIDIAT faculty teaches a series of national training courses in various member countries on re-

quest. Graduate students from USU have also been associated with the CIDIAT program in conducting community development studies for master's theses.

Seven NDEA Spanish Language Institutes have been conducted by USU faculty to give high school Spanish teachers advanced training in the Spanish language and techniques in teaching it. In the summer of 1968, an eighth Institute is scheduled; it will be conducted in Mexico, as were the previous two institutes. USU also has cultural exchange programs such as *Spring Quarter in Mexico* conducted in conjunction with the University of the Americas in Mexico City, and a traveling workshop for graduate and undergraduate art students known as *Utah-Spring-Mexico*.

A high percentage of the approximately 450 Peace Corpsmen who have been trained at USU held Bachelor's degrees before entering the Peace Corps. Three of the eight groups were trained for South American countries and four for Iran, where USU maintained formal contracts for 13 years.

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UTAH STATE UNIVERSITY
Logan, Utah 84321

APPLICATION FOR ADMISSION PART II

Give quarter and year
you now plan to enter.

Date _____

Name _____
Last First Middle Maiden

Social Security No. ____-____-____

Permanent Home Address _____
Street Number City County State

Logan Address _____
Street Number City State Selective Service No. ____

Mailing Address _____
Street Number City State

Place of Birth _____ Date of Birth _____

Check: Male ☐ Female ☐ Single ☐ Married ☐ Citizenship _____
Country State

How long have you lived in the state listed above _____ continuously since _____

Have you attended Utah State before ☐ yes ☐ no If so give last quarter and year _____

Have you enrolled under any other name? If so give name used _____

Have you ever enrolled in USU Home Study or Extension Classes? ☐ yes ☐ no When _____

Have you selected a subject in which to major (See list of majors on page 3) Yes ☐ No ☐
If so list major _____

CHECK COLLEGE IN WHICH YOU PLAN TO REGISTER: Agriculture_____, Business & Soc. Sciences_____, Education_____,
Engineering_____, Family Life_____, Humanities & Arts_____, Natural Resources_____, Science_____, Graduate School_____,
Undecided

Name of Parent or Legal Guardian _____ Relationship _____

Address of Person named above _____
Street Number City County State

Name of High Schools Attended	Name of School	City and State	Date of Attendance	Year of Graduation	Degree
Names of all Colleges and Universities Attended					

Failure to list all institutions attended may result in loss of credit or dismissal.

CODED _____ CHECKED _____ ENTERED _____ CHECKED _____ KEYPUNCH _____ VERIFIED _____

GRADUATE STUDENTS SHOULD SEND THIS FORM TO THE DEAN OF THE GRADUATE SCHOOL FOR HIS ACCEPTANCE AND
SIGNATURE.

STUDENT NO. _____
DO NOT WRITE BELOW

Eval _____ Post _____
Send Permit: _____ Reg. _____
Wn'd _____ Prob. _____
College _____

Yr. of Entry _____ N.F.R. _____

Yr. Birth _____ Sex _____

Adm. Status _____ County _____

State or Country _____

High School _____

Previous College _____

Class Rank _____

Send AR 102 _____
Application _____
Supplement _____
High. Sch. Tr. _____
Col. Tr. _____
Health Form _____
Test Scores _____
Other _____

Rfr to Dean _____
Rfr to Committee _____
Remarks _____

Accepted by:
Dean of College _____
Admissions Committee _____
Graduate Dean _____

Signature _____

DEPARTMENTAL COPY
UTAH STATE UNIVERSITY
Logan, Utah 84321

FOR DEPARTMENTAL USE ONLY

Overall GPA
GPA for last two years
GPA for Masters Degree (If applying
for doctorate work.)

APPLICATION FOR ADMISSION

☐ Fall ☐ Winter ☐ Spring ☐ Summer

School Year 19.....

Date of Application

1. Name in full Soc. Sec. No.
(print) Last First Middle

2. If you have used a different name while attending school, give name formerly used

3. Mailing address Telephone
Number and street or RFD City State Zip

4. Permanent address (if different)

5. Place of birth Date of birth Please check: ☐ male ☐ female ☐ married ☐ single

6. Citizenship (Check one): ☐ U.S. Citizen ☐ Immigrant ☐ Student Visa ☐ Other

7. List in chronological order all colleges attended. (Attach separate sheet if needed)

Name of Institution	Location	Dates of attendance (Month and Year)		Date Graduated and Degrees
		From	To	

8. List undergraduate major and degree obtained Undergraduate minor

9. In what subject do you plan to major as a graduate student?

10. Toward what degree or certificate do you plan to work?

11. If you plan to teach, indicate: ☐ Elementary ☐ Secondary ☐ College ☐ Other

12. List names of national graduate admissions tests that you have taken:

..... most recent date taken:
..... most recent date taken:
..... most recent date taken:

13. List three persons whom you will ask to mail a confidential report on your qualifications to pursue graduate work, directly to the School of Graduate Studies. This list should include at least one character reference, and the major professor of your baccalaureate program, and if you are a teacher, your principal or supervisor. Complete and correct addresses are necessary. (Not required for non-degree seeking applicants.)

	Name	Position	Address
(1)			
(2)			
(3)			

14. If you are married, please enter your husband's or wife's name No. of children

15. Parent's name Address

16. If parents are deceased, give name and address of nearest relative

17. Have you served in the U.S. Armed Forces? Date enlisted Date discharged

18. List your occupation for all periods since high school graduation not accounted for by school attendance or service in Armed Forces. (Use additional sheet if necessary.)

Dates (Month and Year)	Occupation	Employer	City and State

19. On a separate sheet write a personal letter expressing your specific interests and objectives as a graduate student.

Signature of Applicant

**SCHOOL OF GRADUATE STUDIES
UTAH STATE UNIVERSITY**

Logan, Utah 84321

APPLICATION FOR ADMISSION

☐ Fall ☐ Winter ☐ Spring ☐ Summer

School Year 19.....

Date of Application

INSTRUCTIONS:

1. Fill out completely and send to School of Graduate Studies, Utah State University, Logan, Utah 84321.
2. Arrange immediately with each college attended to send required official transcripts (2, if degree-seeking; 1, if certifying or non-degree-seeking).
3. Arrange to have the persons listed in item 13 send letters of recommendation immediately.

1. Name in full Soc. Sec. No.
(print) Last First Middle

2. If you have used a different name while attending school, give name formerly used

3. Mailing address Telephone
Number and street or RFD City State Zip

4. Permanent address (if different)

5. Place of birth Date of birth Please check: ☐ male ☐ female ☐ married ☐ single

6. Citizenship (Check one): ☐ U.S. Citizen ☐ Immigrant ☐ Student Visa ☐ Other

7. List in chronological order all colleges attended. (Attach separate sheet if needed)

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..... most recent date taken:
 most recent date taken:
 most recent date taken:

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(3)		

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Signature of Applicant

